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Dr. Dahlberg, Assistant Professor, Department of Geography, University of California, Los Angeles, does teaching and research in cartography, and is the faculty supervisor of the UCLA Map Library. Recently he lectured to teachers of the southern California area on cartography for today's schools in an extension series entitled "The Impact of Research in the Social Sciences on American Education."

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Dr. Mayfield will become Associate Professor and Chairman of a new department of geography at Texas Christian University, Fort Worth, Texas, in the fall of 1961. His Ph.D. was conferred March, 1961, by the University of Washington. He conducted field research in eastern and northern India during 1957-58 under the Foreign Field Research Program of the National Academy of Sciences, National Research Council, supported by the Office of Naval Research.

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Dr. Doerr resigned about a year ago as Chairman of the Department of Geography, University of Oklahoma to become Associate Dean of the Graduate College. He was a Fulbright Professor at the University of the Philippines 1958-1959. He has degrees from the Southern Illinois University, Indiana University, and Northwestern University.

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Mr. Young, Assistant Professor, Department of Geography, University of Alberta, Edmonton, is a graduate of Cambridge and Rhodes Universities. He taught and lectured in South Africa for 6.5 years before going to Canada in 1960. He visited Basutoland, the subject of his present article, in January of last year.

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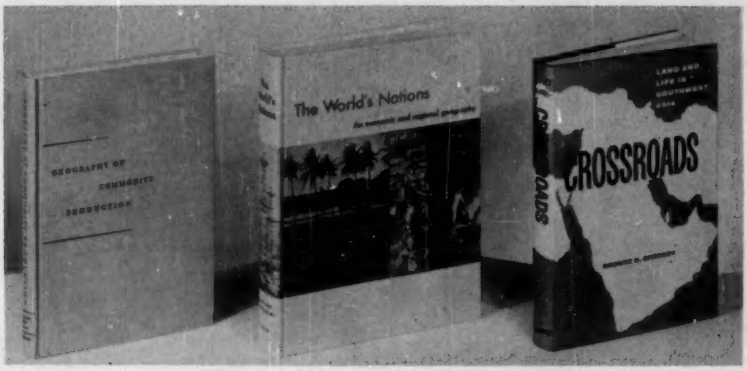

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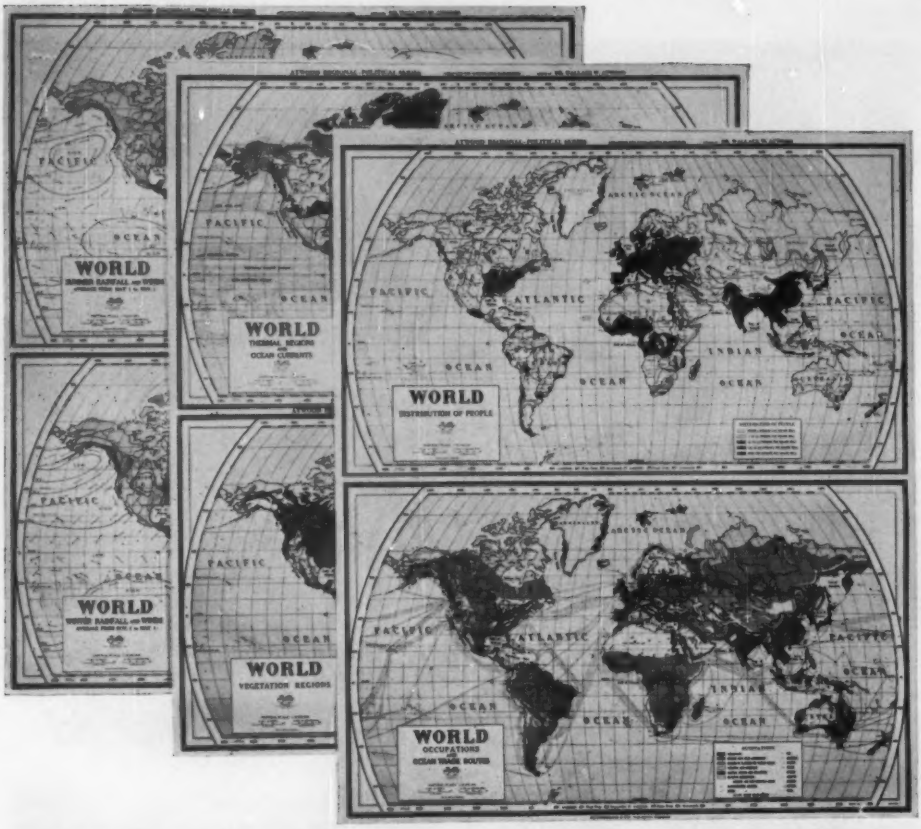

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THE GROWING POPULATION OF THE UNITED STATES*

ROBERT C. KLOVE
Geography Division, Bureau of the Census

THE TERM "population explosion" is very popular today for describing the recent population growth and the future projections of this growth both in the United States and in the rest of the world, but it is not at all an accurate description of this growth in terms of the dictionary definition of "explosion" which is a "violent bursting." The population growth phenomenon which it calls attention to, however, is extremely important to mankind and especially to geographers for whom man is the keystone of their science. We must understand what constitutes this population growth and why it is considered so significant at the present time. I can only begin to answer these questions for the United States in this short paper.

Population Trends from 1790 to 1960

The population of the United States has grown from almost four million in 1790 to over 179 million in 1960[1] (Fig. 1). The absolute amount of population increase has been greater for every decennial census period than the preceding period with three exceptions. These were the Civil War decade from 1860 to 1870, the World War I decade from 1910 to 1920, and the depression years from 1930 to 1940. The decade of 1950-1960 showed an increase of 28 million compared with 19 million from 1940 to 1950.

The rate of population growth from 1790 to 1860 was very high, varying for the decades from 33 per cent to over 36 per cent. It dropped down to 23 per cent for the 1860 to 1870 period, then rose to 30 per cent for the 1870 to 1880 period, and then gradually declined hitting a low of 7 per cent in 1930 to 1940. It rose to 14.5 per cent from 1940 to 1950 and our recent Census shows a growth of 18.5 per cent from 1950 to 1960. The last decade has shown a rate of growth higher than for any period since 1900 to 1910. It is this sharp upturn of the rate of growth that has led some analysts to describe the situation as a "population explosion." The population of the United States would double in about forty years if growth rate remained the same, but the growth rate is unpredictable.

Factors Affecting Population Change

There are only four factors that can affect the population of a country or any area for that matter. These are births, deaths, immigration, and emigration. In the history of our country these factors have shown great variation. The early history of the United States was characterized by a high birth rate and heavy immigration. The death rate also was high

* Paper given at the annual meeting of the National Council for Geographic Education on November 25, 1960 at Cincinnati, Ohio.

[1] "United States," Advance Reports, Final Population Counts, 1960 Census of Population, PC(A1)-1, Bureau of the Census, November 15, 1960.

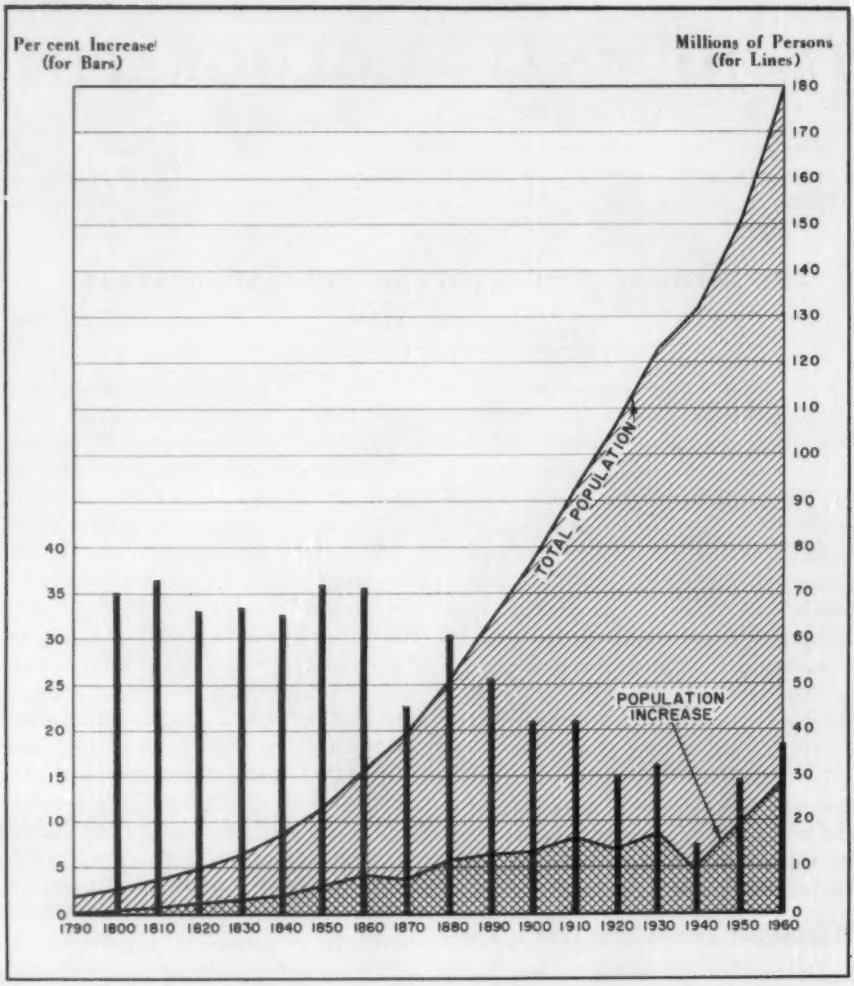

FIG. 1. Total population, population increase, and per cent increase: 1790-1960.

but has steadily declined and may continue to do so. Immigration fell off by World War I, and the birth rate declined, reaching a low period in the depression decade of 1930 to 1940. The recent heavy population growth is primarily due to a higher birth rate and the continuing decline in the death rate.

In estimating future population, it is necessary to consider the future behavior of the four factors already mentioned. Certain assumptions must be made and these are based upon recent developments. We can assume that the death or mortality rate will continue to decline in the immediate future provided that there is no major war or other catastrophe such as might result from an atomic explosion. We can further assume that the net effect of immigration and emigration will remain about the same so long as it is our national policy to restrict immigration. The remaining factor of births, or the fertility rate, is subject to

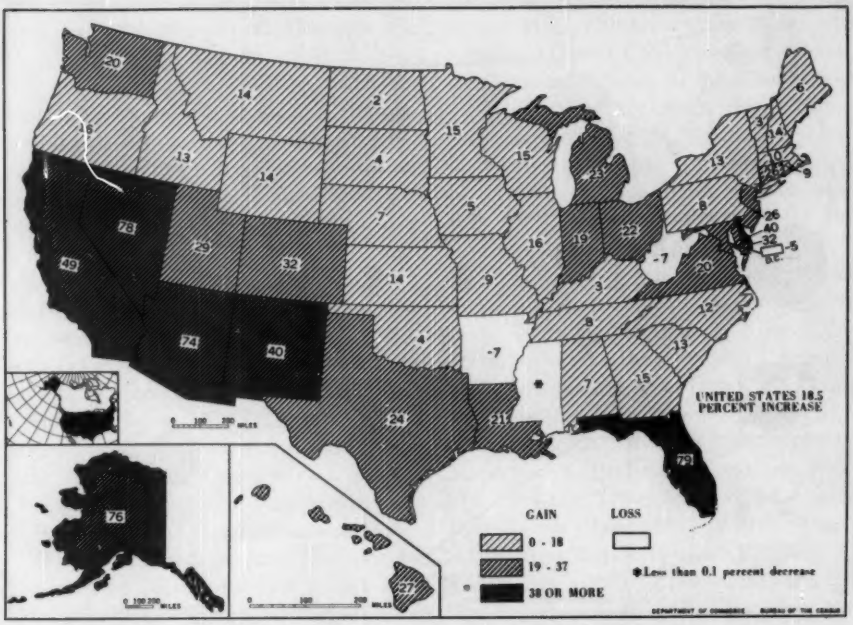

FIG. 2. Per cent change in population by States: 1950-1960.

wide fluctuation, making it very difficult to predict future population.

Population Projections

Leading demographers including those at the Census Bureau have often failed in the task of estimating correctly the future population. Nevertheless, techniques for the projection of population into the future are improving, and it may be interesting at this point to examine population projections to 1980 made by the Bureau of the Census. Four projections have been made, based on different fertility assumptions.[2] In each case it is assumed that there will be no major depression and that employment and economic activity will remain high. The lowest projection gives 231 million for 1980 and the highest 273 million. This would be an increase in population during the next 20 years of from between 52 million and 94 million. Such an increase would produce many problems for the American economy.

High population growth is not limited by any means to the United States; it is a world phenomenon. Continued decline in mortality without decline in fertility makes for great increases in many already densely populated areas. This population growth in the United States deserves our serious attention, though it is not presently as critical a problem as in some countries of the world.

The Distribution of Population Change

The rest of this paper is devoted to study of the differential growth of population across the United States. The population increase is not being evenly distributed nor is it being distributed in the same patterns as in the past in many cases. My emphasis is on the changes during the recent decade from 1950 to 1960 and is based on early results from the

[2] "Illustrative Projections of the Population of the United States by Age and Sex, 1960 to 1980," *Current Population Reports, Series P-25 No. 187*, Bureau of the Census, November 10, 1958.

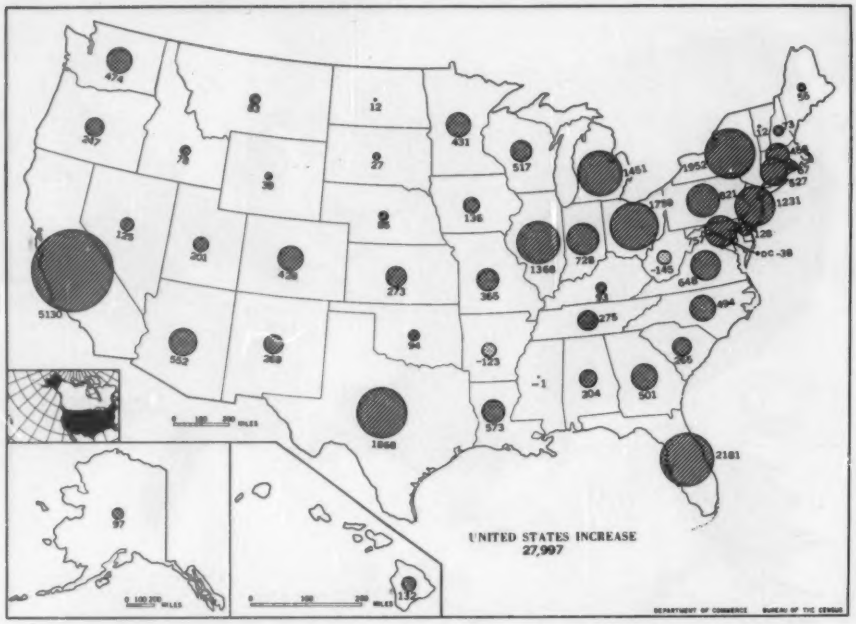

FIG. 3. Absolute change in population by States: 1950-1960.

1960 Census. Where preliminary figures are used they are indicated.

Change in Total Population from 1950 to 1960

There are different ways of analyzing the change in total population in the United States. We know that the total population of the United States increased from 151 million to 179 million, an absolute increase of 28 million or a percentage increase of 18.5 per cent. This increase can be distributed by various area subdivisions, such as Census regions or divisions, States, counties, minor civil divisions, or other area categories. I have had to make a selection and am drawing your attention to the distribution by States.

There are other ways of looking at the change in total population irrespective of the size or type of area examined. For this purpose I have selected four subjects—per cent change, absolute change, relative change, and direction of population change as shown by change in the movement of the center of population.

Let us first look at the map of per cent change in population by States, 1950 to 1960 (Fig. 2). This shows 7 States with a very high percentage of population increase—4 in the Southwest, including California, Nevada, Arizona, and New Mexico, Florida in the Southeast, Delaware in the East, and Alaska. Florida, Nevada, Alaska, and Arizona had the highest percentages of increase. Thirteen other States had percentage increases above the national average. These included Washington in the Northwest, Utah and Colorado in the Rocky Mountains, Texas and Louisiana along the Gulf Coast, Michigan, Indiana and Ohio in the North Central area, Virginia, Maryland, New Jersey, and Connecticut on the East Coast, and Hawaii. All other States had gains of a lower percentage than the national average, and 3 States

lost population, namely West Virginia, Arkansas and Mississippi, although the loss in Mississippi was very small.

We see a different picture when we look at the absolute change in population by States from 1950 to 1960 (Fig. 3). On this map, the great gain in California of over 5 million stands out above all the other States. Florida is second with over 2 million. New York in third place, with a gain just under 2 million, had a much smaller percentage gain, in fact one that was below the national average. Fourth was Texas with 1,868,000, but Texas had a high percentage gain. Then followed Ohio, Michigan, Illinois, and New Jersey, all with gains of more than 1 million. Nevada and Alaska with high percentage gains had relatively small total absolute gains in population.

Quite a different pattern is shown by the map of change in each State's percentage of the United States population (Fig. 4). This is the kind of map which Raymond Murphy has called a relative change map. The great gains in relative standing of both California and Florida are indicated hereon. At the other end of the scale, New York and Pennsylvania have lost standing in population more than any other States. Here we also see a pattern of loss that extends from Georgia and the Carolinas across many of the Southern and Border States to the Midwestern States, to the northern Rocky Mountain States, and to Oregon's Pacific coast. New England, except for Connecticut, and the Middle Atlantic States, except for New Jersey, also show a "strong" loss in standing. The major areas of gain, are the Southwestern States from California to Louisiana, Florida, the Great Lakes States of Michigan, Indiana and Ohio, and the Atlantic Coast States from Connecticut to Virginia.

The new center of population for the 50 States based on preliminary population figures is about 50 miles east of St.

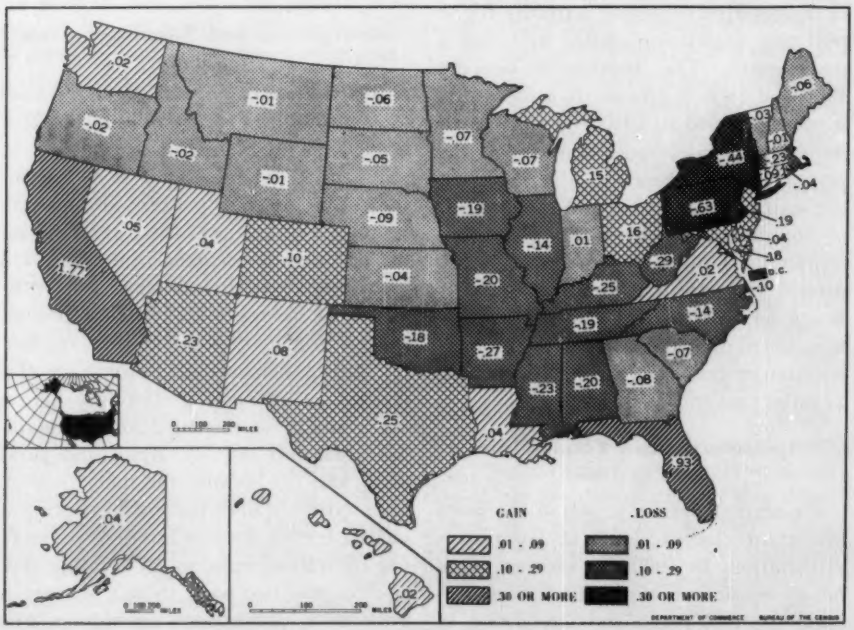

FIG. 4. Change in each State's percentage of United States population: 1950-1960.

FIG. 5. Centers of United States population: 1950 and 1960 (on map of Southern Illinois).

Louis or 9 miles northwest of Centralia, Illinois in Clinton County (Fig. 5). This estimated center is 47 miles west and 12.5 miles south of the estimated 1950 center of the 50 States. The distribution of the population growth is continuing to pull this population center west and a little south. The movement between 1950 and 1960 is greater than the movement from 1940 to 1950 and that represented the greatest movement during the present century. You will also note that the map shows the 1950 and 1960 centers of population for the 48 States or conterminous United States, a term approved last year by the United States Board on Geographic Names. The addition of Alaska and Hawaii moved the population center of 1950 an estimated 17 miles west and 2.5 miles south.

Population Density Change from 1950 to 1960

Population density is one of the more important characteristics of population distribution. In 1960 the average population density of the United States, including the 50 States and the District of Columbia, was 50.5 persons per square mile. This compares for the same area with 42.6 persons per square mile in 1950 or an increase of 7.9 persons per square mile. The map (Fig. 6) shows that the smaller States had the larger increases in density. New Jersey gained 164 inhabitants per square mile, Connecticut 108, Maryland 77, Delaware 65, Rhode Island 64, and Massachusetts 58. Note that New York, while it had a heavy loss in the proportion that its population was of the United States population, gained in population density more than California. Of course, California's large area prevented it from having a greater gain in population density. . . . Both Ohio and Florida, which are good-sized States, areawise, had fairly high gains in population density. Except California, all of the Western States and the Great Plains States from North Dakota to Texas had low gains in population density. Alaska had the smallest gain in population density, which could be expected because of its enormous area.

Metropolitan and Nonmetropolitan Population

Distribution of population on the basis of metropolitan and nonmetropolitan residents is of increasing significance in the United States. The 1960 Census shows that about 85 per cent of the population growth in the United States during the past decade occurred in the standard metropolitan statistical areas. I have selected the metropolitan-nonmetropolitan concept for analysis rather than the better known urban-rural concept for two reasons: (1) because preliminary figures are available at this time for metropolitan areas but not for urban and rural areas and (2) because the metropolitan-nonmetropolitan dichotomy has been less emphasized in the past but deserves more emphasis in my opinion. By dividing population into two parts in this manner, a great many distinctions are hidden. The metropolitan character of the New York

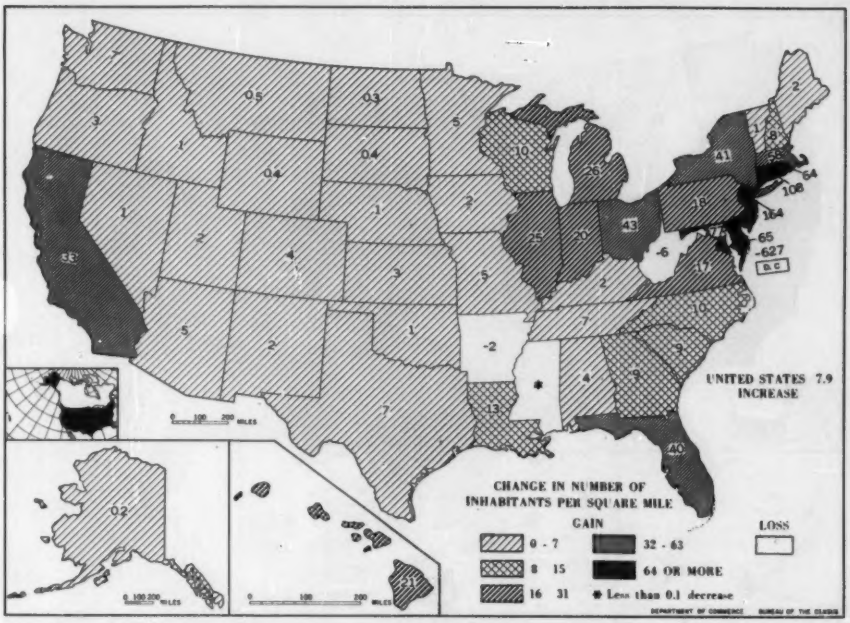

FIG. 6. Population density change by States: 1950-1960.

area is quite different from that of the San Angelo, Texas area. Some metropolitan areas contain quite a bit of rural population. Some nonmetropolitan areas contain much urban population which is more akin to some of the metropolitan population. Nevertheless the standard metropolitan statistical area definitions of the Budget Bureau which are used by the Bureau of the Census follow criteria which have been uniformly applied across the Nation and are useful for bringing out distinctions in population distribution.

The 1960 Census shows that 63 per cent of the population of the United States now lives in standard metropolitan statistical areas[3] (Fig. 7). The per cent of population that is metropolitan varies greatly between the States. Only Alaska, Idaho, Wyoming, and Vermont have no metropolitan population. The most metropolitan State is Rhode Island with 87 per cent of its population thus classified. New York and California each have 86 per cent, Massachusetts 85 per cent, and other States above 75 per cent are Hawaii, New Jersey, Connecticut, Pennsylvania, Maryland, and Illinois. To these 10 States may be added 10 States which have a percentage of metropolitan population which is greater than the United States average of 63 per cent. Five more States have more than half of their population in the metropolitan class which leaves the remaining 25 States, including the 4 with no metropolitan population, having less than 50 per cent of their population in the metropolitan class. Note the distribution of this latter group. It includes the northern New England States, most of the Southern States except for 3 which face the Gulf Coast, the Great Plains States, the northern Rocky Mountain States, and a few others.

[3] "Population of Standard Metropolitan Statistical Areas, 1960 and 1950," Preliminary Reports, 1960 Census of Population, PC(P3)-4, Bureau of the Census, October, 1960.

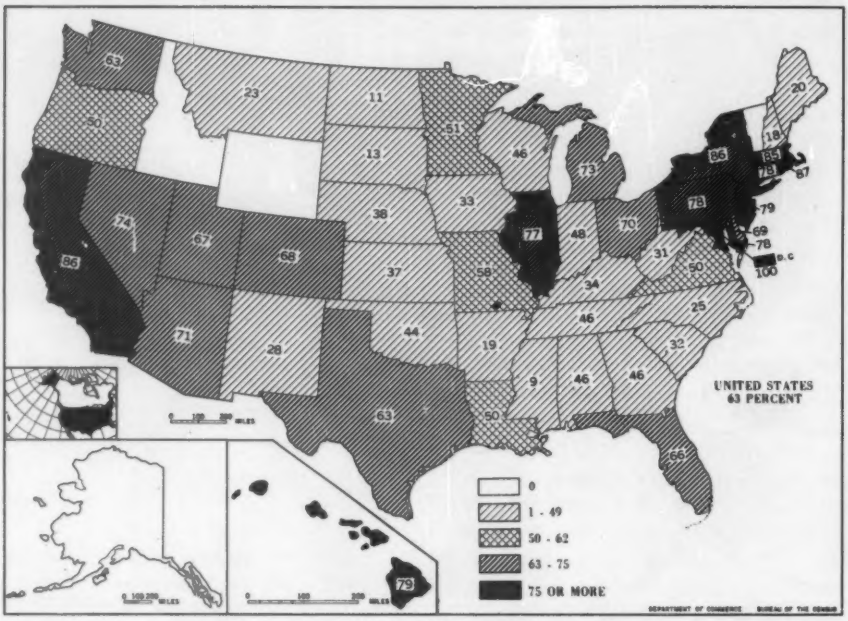

FIG. 7. Per cent of metropolitan population by States: 1960.

The United States had a 25 per cent increase in metropolitan population between 1950 and 1960 (Fig. 8). Most of the real high percentage increases were in the southern Rocky Mountain States i.e. Nevada, Arizona, New Mexico, and Colorado. These States have few metropolitan areas but those few have had very large gains in population. Reno and Las Vegas in Nevada became metropolitan areas for the first time in the 1960 Census. Phoenix and Tucson in Arizona had great increases. Albuquerque in New Mexico, and Denver, Pueblo, and the new SMSA of Colorado Springs, all had large increases. The only other State to have more than a 50 per cent increase in metropolitan population was Florida which had an increase of 91 per cent. Other States with a per cent increase greater than the national increase, in general, clustered around these 5 States of high increase. Thus, this includes a belt of States almost continuous from California to Florida with very high increases in metropolitan population. Other States with higher than average metropolitan growth rates were Virginia and Maryland caused primarily by the great increase in the Washington, D.C. SMSA, and also Delaware, Minnesota, Montana, Washington, and Hawaii. The Northeastern States and the East North Central States, with the greatest metropolitan and urban population, generally had only moderate percentage increases in this population.

The nonmetropolitan population of the United States increased by only 6 per cent between 1950 and 1960 (Fig. 9). States with very high increases were Florida, New Jersey, and Delaware in the East, California, Arizona, and New Mexico in the West plus Alaska which, of course, had no metropolitan population. All of the Western States except Colorado had increases above the national average. Almost all of the States with de-

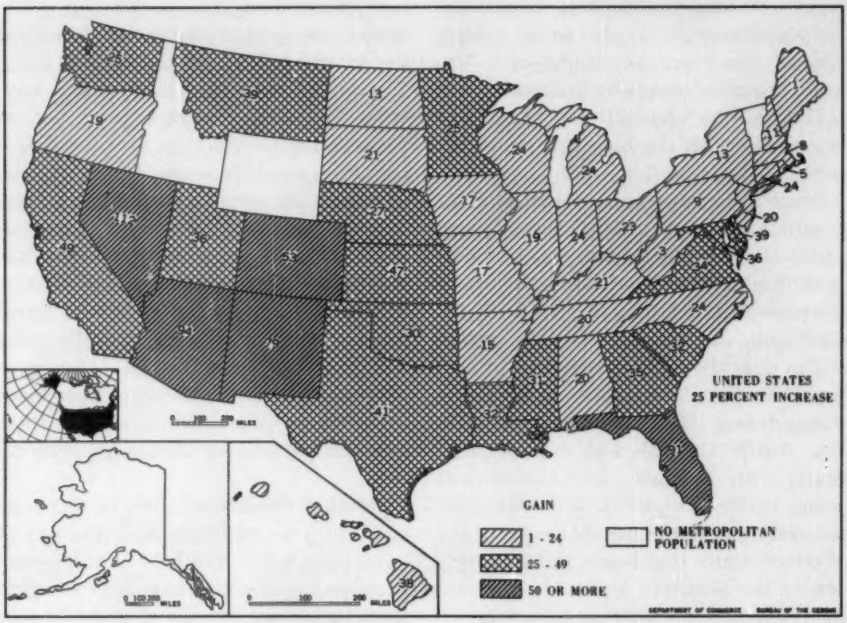

FIG. 8. Per cent change in metropolitan population by States: 1950-1960.

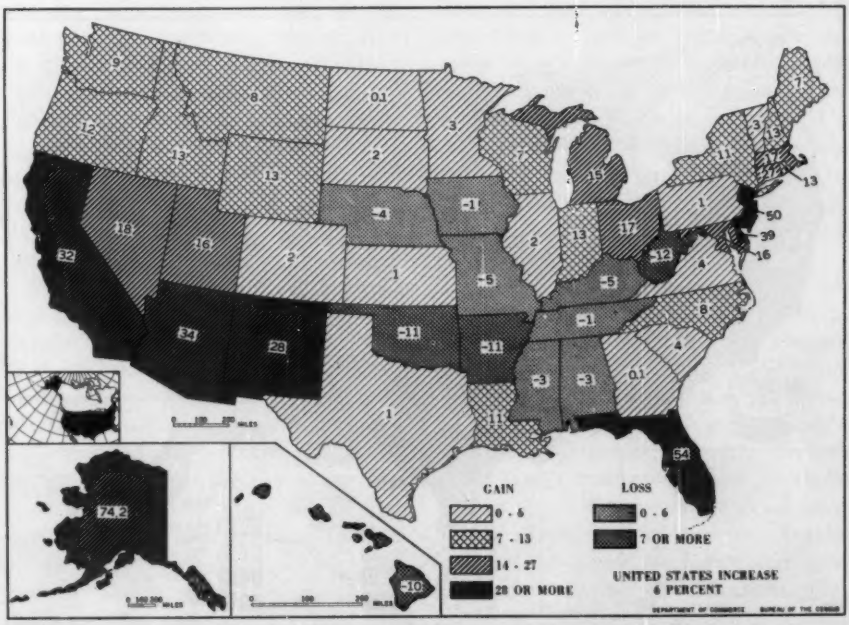

FIG. 9. Per cent change in nonmetropolitan population by States: 1950-1960.

creases in nonmetropolitan population are contiguous and located in the general area of the lower Mississippi and Missouri River valleys. The only exception is Hawaii, which had a loss of 10 per cent in contrast with the high gain of 74 per cent in Alaska.

A relative-change map of metropolitan population brings out some changes which the other change maps do not reveal (Fig. 10). The relative gain in the metropolitan population of 3 States, California, Texas, and Florida, stands out as does the high relative loss in metropolitan population in New York and Pennsylvania. Most of the losses were in the North Central and Northeastern States with Michigan and Connecticut being major exceptions. It is especially interesting here to note that none of the Western States had losses and relatively few of the Southern States.

Final Comments

You will have noted that my exposition of the changes in population distribution consisted of simple descriptions of the patterns shown by the various maps. There has been no comparison with other geographic patterns and no explanation of the changes. Such analysis is certainly needed though beyond the scope of this paper. Furthermore, only some of the gross patterns of change in the United States have been indicated. Additional maps showing distribution by counties or smaller areas would reveal other significant changes that the maps based on State units conceal. It has been my major purpose in showing these maps to stimulate your interest in why these different patterns of change are showing up.

Another major limitation in this presentation is its confinement to changes in total population numbers. The changes in population characteristics and their distribution are at least of equal importance. I refer to age, sex, race, national origin, marital status, size of household,

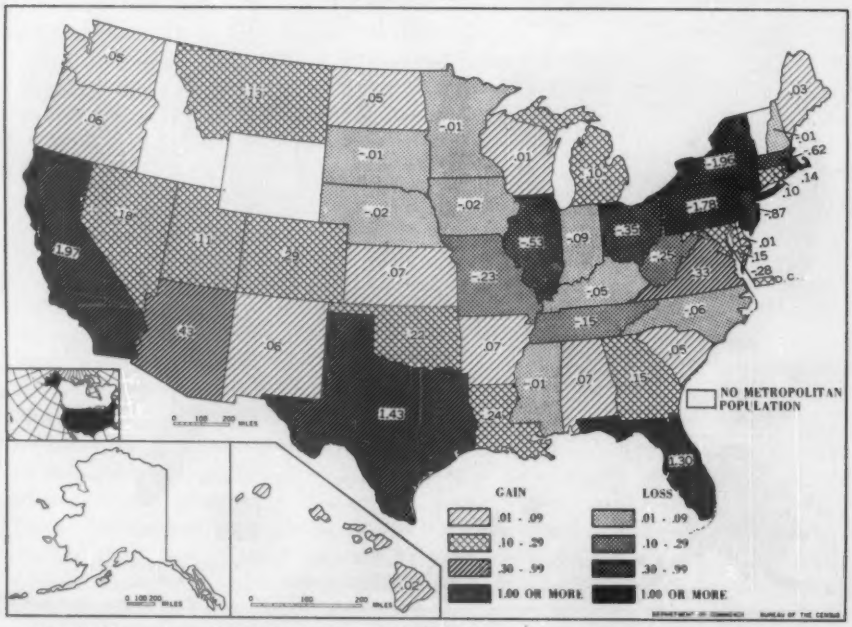

FIG. 10. Change in each State's percentage of United States metropolitan population: 1950-1960.

occupation, employment, education, income, and other information about population which will be available from the Census. Let me illustrate with reference to the age characteristic. Because of the higher birthrate in recent years the number of persons under 20 years of age has increased rapidly, and high school and college ranks will be swelled greatly in the coming decade. Because of the lower birth rate from 1925 to 1940 the number of persons in the age group of 20 to 35 is less than the normal distribution. Because of a steadily lowering mortality rate the number of persons in the older age groups is larger than in the past. These three facts are of great significance to our economy, our government, and our culture. Geographically these age groups are not evenly distributed and differences in distribution result in different problems for different areas, but not always are these facts understood. It is to be hoped that the population data to become available from the 1960 Census will encourage many geographers to undertake studies of population geography.

MAPS WITHOUT PROJECTIONS

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THOUGH NOT a new practice, the publication of world school maps without projections is an unfortunate one meriting both comment and protest. This practice of omitting most or all of the parallels and meridians from published maps is objectionable because of the heavy dependence of the reader upon this grid for judging positional, directional and distance relationships on the map. Further, the grid provides the chief visual basis for relating the map to the globe.

Absence of the grid is an especially serious matter on maps drawn upon projections with a relatively complex network of grid lines. These include the various types of interrupted projections as well as oblique and transverse cases of projections. Many of these projections became popular as the use of the Mercator projection for world school maps waned in the United States amid a storm of protests. Prominent among these were the various projections interrupted in the manner popularized in this country by the late Professor J. Paul Goode of the University of Chicago. Goode's interrupted projections became well known through their widespread use in his outline and wall map series and in his school atlas. These and other similar arrangements enjoyed the sanction of official government use in the Departments of State and Commerce in the 1920's, largely through the influence of the late Dr. S. W. Boggs and Dr. Helen M. Strong. An example, representative of this group of interrupted equal-area projections, is shown in Fig. 1.

Interruptions of the map surface on such projections evoked strong reactions, especially from teachers who claimed their students did not understand them. The purpose of interrupting equivalent, or equal-area, projections such as the sinusoidal, Mollweide, Goode's homolosine, Bogg's eumorphic, and parabolic was to improve upon the representation of the shapes of continents, or, in some cases, of the oceans. On some interrupted projections further modifications were made by omitting sections of the projection considered unimportant to the pur-

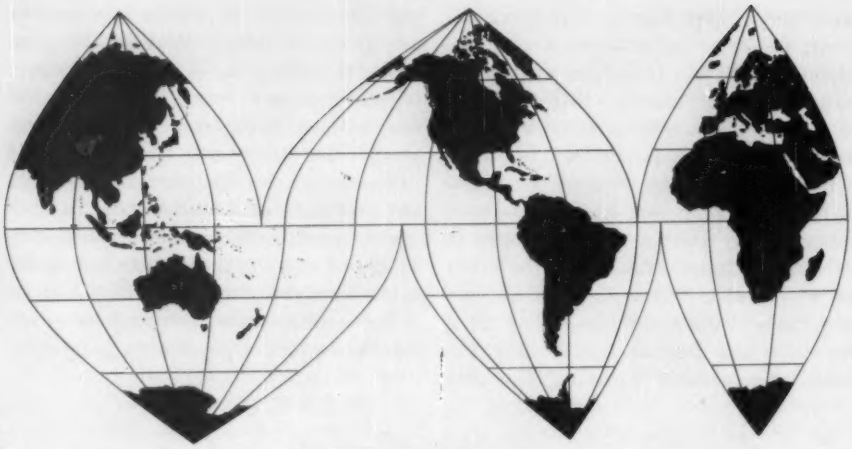

Fig. 1. Interrupted equal-area world map with projection.

pose of the map, thereby "condensing" the projection and achieving a larger scale (Fig. 2).

In the final presentation of world maps plotted on such projections yet another step was taken by some publishers: most or all of the parallels and meridians were omitted from the map. Commonly only the equator, tropical and polar circles were left on the map. In the majority of cases these appeared as straight lines as projections with straight,

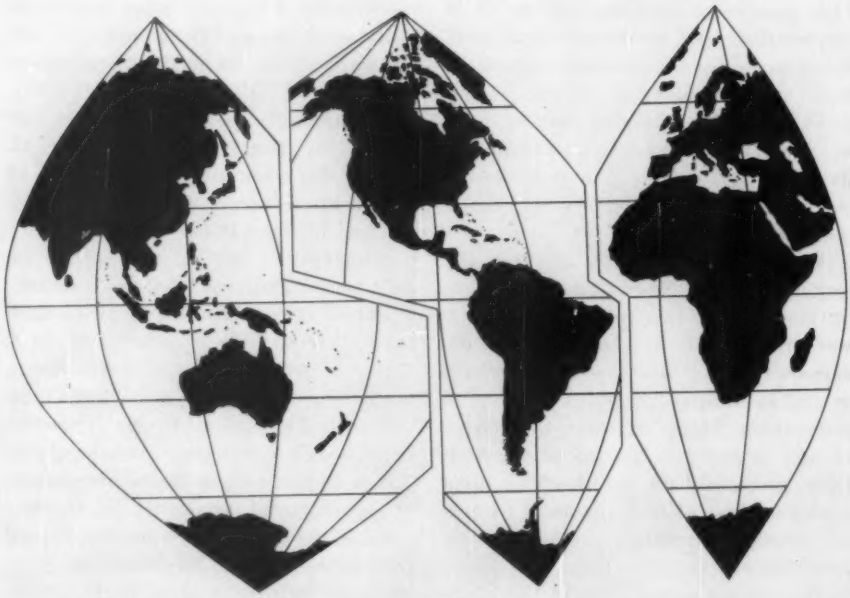

Fig. 2. Interrupted and condensed equal-area world map with projection.

horizontal parallels lend themselves to interruption most readily. On some interrupted maps the only remaining evidence of the projection consists of the smooth edges of the land masses which serve to mark the meridians bounding the various segments of the map. Fig. 3 is representative of such maps on which the reader is largely dependent upon a divided Antarctic continent as evidence of interruption. Though grid lines were omitted to varying degrees and in various ways, the results were much the same; that is, the projectional base was abstracted from the map details.

On many interrupted maps without grids the continents appear in such a fashion that one cannot distinguish between the map area and the non-map or background area. If the map appears in black and white this means that, so far as the reader can determine, the background area becomes a part of the oceans (Fig. 3). On colored maps Antarctica in some cases is spread across the interruptions in the southern part of the map and the interruptions in the high latitude portions of the oceans are colored blue, while the omission of areas from the low and middle-latitude portions of the oceans remains unrevealed (Fig. 4). Furthermore, areas shown as a map inset appear as part of the regular map but in a new and erroneous position. Though the world map may have been drawn on a very carefully selected equal-area projection the net result is a map on which spatial relationships over the world are grossly misrepresented.

The objections raised against deleting the grid must be applied even more vigorously in connection with projections on which the equator and parallels are represented by curved lines.[1] An example of a world map on such a projection appears in Fig. 5 wihout any trace of the grid. This map is enclosed by an oval frame totally unrelated to the projection. In such cases good cartographic practice calls for preservation of the basic form of the grid (Fig. 6). At the very least the outline of the projection should be shown to provide a clue to the overall structure of the map.

The question of whether or not a map

[1] These include oblique and transverse cases of projections as well as those interrupted projections on which the northern hemisphere appears largely intact as either a circle, polygon, or a conic sector with the southern hemisphere appearing as a number of extensions.

FIG. 3. Interrupted equal-area world map without projection (derived from Fig. 1).

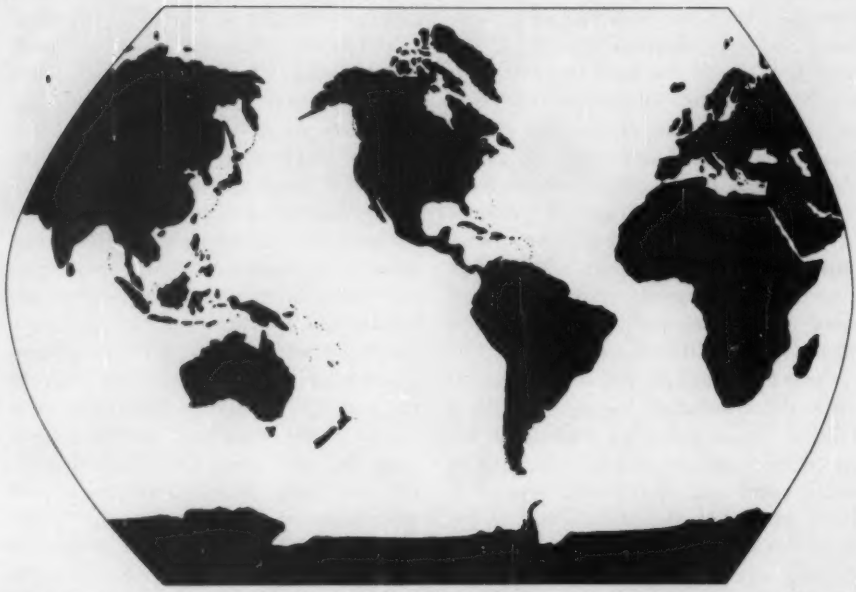

FIG. 4. Interrupted and condensed equal-area world map without projection (derived from Fig. 2).

FIG. 5. Conformal world map in an oval frame without projection (derived from Fig. 6).

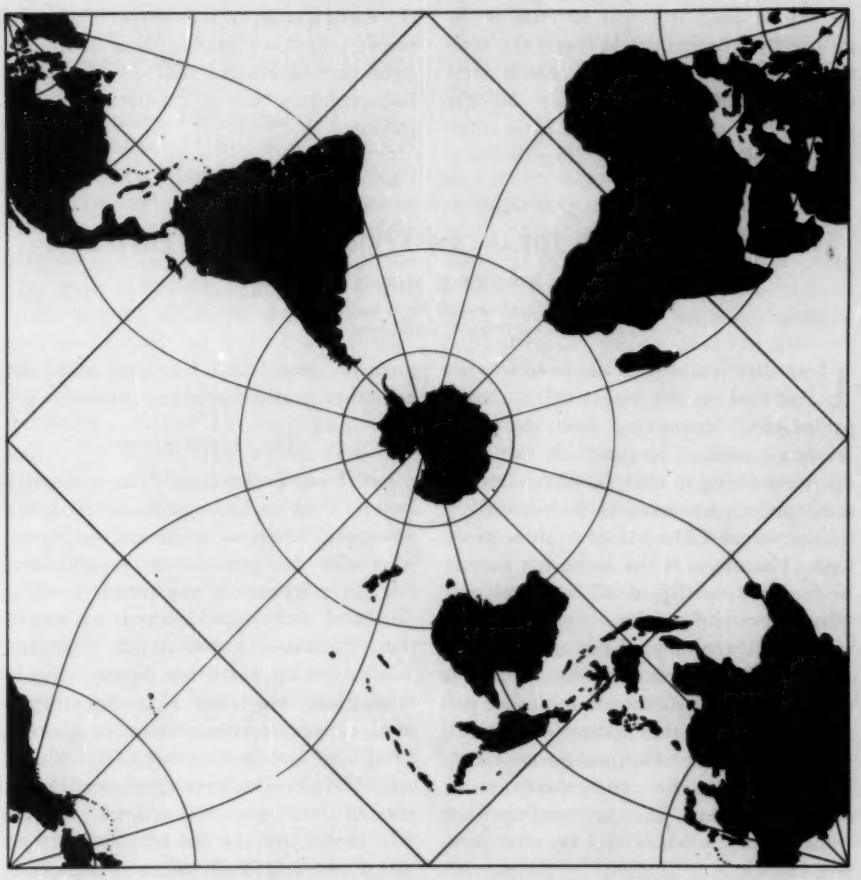

FIG. 6. Conformal world map in a square with projection.

must show the grid is one which can be argued either way, depending upon the general purpose of the map. Our concern here is not with the decorative or trivial uses of such world maps but rather with maps for use in the schools. Therefore, we must conclude that such maps need, first of all, to be functional as teaching aids. Their use, after all, is justified by the need to show spatial relationships. If the map is developed upon a rectangular projection having straight meridians intersecting straight parallels at right angles, the grid is visually simple and is clearly related to the rectangular frame of the map. If, however, the grid lines are such that they change their form across the map, or are interrupted, one must urge strongly that they be kept on the map, at least in sufficient number to suggest to the reader the overall structure of the map.

Summary

The employment of world projections on school maps has been accompanied in certain cases by the improper practice of either omitting the grid entirely or preserving it in a skeletal form only. On some maps interruptions and omissions

are not at once apparent because of the failure to differentiate between the map area and the non-map area. These practices are judged to be poor on the ground that they conceal the basic structure of the projection and therefore misrepresent spatial relationships. They represent perhaps a graver form of misuse than that heretofore resulting from the indiscriminate use of the Mercator projection.

GOODS, MEN, AND IDEAS—AN APPROACH TO A PROBLEM

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IN RECENT years much has been written and said on the topics of "underdevelopment," "resources," and "the population explosion." So much, in fact, that anyone wishing to offer further comment must preface his remarks with some notion of the views he brings to these problems. Therefore, if the following cannot be accepted, neatly, as all the particular "bias" brought by the author, they do represent three of his basic assumptions. (It should be pointed out here that this discussion will be pointed to India, primarily, selecting that nation with which the author is most familiar, as one example drawn from the complex area, South and Eastern Asia. It is believed that the illustration chosen will have comparative value.)

I. An underdeveloped area has two fundamental characteristics: (1) an unsophisticated level of technology and (2) an imbalanced demography.

II. The natural resource components of an underdeveloped nation do not determine the course of economic development for that nation.

III. A major obstacle to the effective utilization of resources in such an area is the national and regional planner's inability to predict the rate of acceptance of new ideas and technical innovations.

The primary purpose of this paper is to discuss an appraoch to the spread of ideas in underdeveloped areas. It is appropriate at this point, however, to comment on some of the implications of the assumptions that have been made.

The Assumptions

Level of Technology. The generally low level of technology found in lesser developed areas is evidenced in many ways that are familiar to geographers. For the purposes of the problem to be discussed, attention is drawn to one of these: primitive communication systems. With some disregard for the earlier generalization, one may note an uneven level of development when comparing rural and urban communication facilities. The city dwellers experience the impact of the mass media systems. The radios in the bazaars, the newspapers read aloud, the amplified voices of the speakers at public gatherings—all supplement the basic patterns of social interaction.

For the rural areas, social contacts are less complemented. Communication patterns there remain relatively primitive after urban centers have undergone technological changes. The personal encounter between an individual who has accepted an idea and a friend or relative who has not accepted it, remains a primary means of spreading that idea. A majority of the inhabitants of India are directly dependent on agriculture for their livelihood. If an over-all technological rise in the rural areas is to be achieved soon, many innovations must travel by way of the social encounter.

For such a technological rise to remain significant for long, the problem of overpopulation must be met.

Demographic Imbalance. For India, the conditions of demographic imbalance have been imposed by a quite high birth rate and a high, but declining, death rate. Virtually all the economic development efforts in progress in the nation seem conducive to increased population growth rates. In response to the proposition that this may be "short run," one must wonder "How short"? Solving the problem of accelerating numbers is *not* listed as one of the five principle objectives of the Indian Third Five-Year Plan, as stated by the Indian Planning Commission.[1] Yet, in an introduction to the plan, a note reveals that the Planning Commission has revised its earlier estimates of India's population for 1966, the terminal year of the third plan, from 434 million to 480 million persons.[2] The Social Services sector of the plan does call for an increase in the number of family planning centers from the existing 1,350 to 8,200. The latter figure was set *before* the operation of the new Central Family-Planning Communication and Motivation Researh Center in New Delhi. The pronounced regional diversity existing within India complicates the application of any nationwide program of preventive checks. There remains some room for doubt then, as to the adequacy of the measure in the Third plan, and even as to the efficacy of the approach. Wadia, in his *Natural Resources and Population of India,* writes: "A national policy imposing limitation upon the growth of population can only be successful in the sense that it may influence public opinion; and those who think of achieving concrete and quick results by intensive propaganda and establishment of clinics exhibit a regrettable lack of insight into the process of social change and evolution."[3]

Natural Resources. Few Geographers give active support to deterministic tenets regarding natural resources and economic development. Even Japan offers sufficient evidence that a nation's living standards may continue to rise without great local bases of natural resources. Obviously, a nation may import resources of superior quality, provided it has the ability to pay for them. The critical point, then, is to insure the development of the most accessible local resources, whatever they may be, with the application of a technology sufficiently advanced to permit rapid formation of capital. Pertinent facets of planning and programming lie in selecting appropriate technologies and in determining the quantitative effort to be made. Ginsburg, in his careful presentation of the relationships between natural resources and economic development, has called for both a detailed inventory of resources and an analysis of obstacles to resource development.[4] Geographers continue to contribute to the inventory; that they can contribute much to the analysis is a premise to be developed further in this paper.

Planning. By definition, planning occurs without foreknowledge of results. The readjustment of goals, as directed by circumstances and the acquisition of data, is a common experience of nations engaged in planning. Even the relatively stable factors of industrial production have not permitted a high level of predictability by Indian planners. Both the Rourkela and Bhilai steel plants were

[1] Draft outline of the Third Five-Year Plan, as released to the press in July, 1960, by the Planning Commission of the Government of India.

[2] *Ibid.*

[3] P. A. Wadia, *Natural Resources and Population of India,* Bhatkal, Bombay, 1959.

[4] Norton Ginsburg, "Natural Resources and Economic Development," *Annals,* The Association of American Geographers (Vol. 47) (September, 1957), pp. 197-212.

completed as planned, but not commissioned as scheduled, for lack of coking coal. Very recent discoveries of metallurgical coal in Bokaro and Raniganj may provide the needed raw materials, eventually. In the meantime, economic growth is stunted.

If there is difficulty in meeting planned industrial goals, one may very well despair over the prospects for success in planning that is closely related to human choice and action. Yet, if there is any opportunity for the planners in lesser developed areas to predict the rate of spatial diffusion of an idea or a technique, after a given input, that opportunity must be considered. The Swedish geographer, Hägerstrand, has laid much of the foundation for such a possibility in his work with simulation models.[5] Comments on the feasibility of directing this work into area development have been made by Ullman.[6] A brief discussion of the nature of the simulation model approach is in order.

The Simulation Model

The name of the approach, *simulation,* is the key to an understanding of it. Any geographer who has made a relief map or demonstrated land form development with a sand table has used the simulation technique. The heart of the approach is to reduce a complex real situation to a model which simulates, in a relatively simple fashion, the gross features of the real situation. As the geographer may acquire the techniques and know-how necessary for relief model construction, so may he acquire the mathematical tools needed to operate the simulation model.

What are the rudiments of model design for studying the diffusion pattern of an idea or technique, given its initial introduction in the area? Hägerstrand has described his simulation of diffusion in terms of a game.[7] At its least complex stages, the game takes place on a uniform plain with ideal communication and transportation conditions. The members of an evenly distributed population are the gamepieces. One person is given the idea to be diffused. Some random process, such as dice throwing, is used to plot encounters of the idea carrier with the uninformed persons distributed around him. Each person contacted becomes a carrier who also encounters the uninformed at random. A major restriction entered on the probability of pairing is that according to the distance between the carriers and non-carriers of the idea. The idea is thus diffused through pairs of social contacts. Much of the situation as described solicits objections. Areas of human habitation are not uniform in surface, population is not distributed evenly, and the obstacles to communication are many. An individual who finally accepts an idea may have required multiple contacts, not one only. The complaint, then, is that the model does not face up to reality. The attractiveness of simulation is that, as information accumulates, it is possible to incorporate the needed restrictions on the operation of the model. Hägerstrand has simulated the actual spread of innovations in Sweden. After noting that the real world itself contains elements of randomness. he writes, "the similarities (of the simulation and reality) are such that it seems not to be entirely out of place to look

[5] T. Hägerstrand, "Innovationsforlöppet ur Korologisk Synpunkt," University of Lund, Lund, Sweden, 1953.

———, "Migration and Area," *Migration In Sweden: A Symposium,* Hannerberg, Hägerstrand, and Odeving, eds., Gleerup Publishers, Lund, Sweden, 1957.

———, "On Monte Carlo Simulation of Diffusion," prepared for the NAS-NRC Symposium on Quantitative Problems in Geography, sponsored by the Office of Naval Research, May, 1960. In preparation, The Free Press.

[6] Edward L. Ullman, "Geographic Theory and Underdeveloped Areas," in Norton Ginsburg ed., *Geography and Economic Development,* University of Chicago Press, Chicago, 1960, pp. 29-31.

[7] T. Hägerstrand, "Monte Carlo Simulation of Diffusion," *op. cit.* This work is well supplied with maps and diagrams.

upon the actual diffusion as just another of the possible realizations of our game."[8]

The degree of success achieved in testing theoretical constructs depends rather heavily on the nature of the data available. For the problems approached in this paper, rigorously designed and carefully conducted field research would be required. Some of the pertinent data could best be provided by other disciplines—and interdiscipline *teams* are easier to dream of than to realize. There is much for geographers to do, however.

In certain of the Swedish simulations, reasonable results were obtained by paying attention to only three factors: the uneven distribution of population, the uneven transportation network, and the physical barriers to communication.[9] These are sound, mappable problems for the Indian regional geographer. It seems doubtful, however, that these would be adequate for simulation of diffusion in India. Of likely importance would be the distribution of the various social, linguistic, and religious groups within which an idea carrier might or might not be free to move. A language barrier could prove as effective a block to communication as an unbridged river, and rural India experiences both. One word of caution before the Indian geographer is urged to map everything at hand: a recent study was made of twenty-one factors believed to influence the economic interactions over space of villagers in central Punjab.[10] Only four factors were found to be statistically significant at reasonably high levels of confidence. One must remember that in simulation, the goal is not to recreate the real situation, but to express it efficiently.

To inaugurate simulation of idea diffusion in India, an actual example of such a diffusion should be mapped, sequentially, for comparative purposes. One can think of no more apt an illustration than that of the spread of voluntary sterilization of males, expanding in 1956 from 7,800 to more than 31,000 in 1959. A regional study in Madras State, where sterilization is encouraged, would be invaluable.

Must the planners in the nations of South and Eastern Asia wait until intensive research activities have been conducted before simulation as an approach has meaning? Fortunately, that is not the case. There is one particularly pertinent implication from the simulation studies that have been made in other areas. It is as follows: the most rapid saturation of a region with an idea or innovation occurs when the initial idea carriers are *clustered*, not when distributed evenly. Perhaps the community development programs in India would have had more success, generally, if attention had been paid to this principle.

In examining the problems of effective utilization of geographic resources and the quandaries of the population explosion, one senses the urgency of applying whatever tools are available. The simulation model has been reaffirmed as an approach to be considered.

[8] *Ibid.*
[9] *Idem.*
[10] R. C. Mayfield, "Consumer Movement and Range Factors," in progress.

CHANGING LAND-USE PATTERNS OF THE PHILIPPINES

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DESTRUCTION attendant to World War II, recent political independence, the 'Huk' struggle, a burgeoning population, political immaturity, foreign investment, national planning, and other factors have contributed to an evolutionary change in land-use patterns in the Philippines. Some changes have been dramatic, others subtle. Change has permeated every facet of Filipino life, and

because of the primary nature of the Philippine's economy, land-use changes have significant economic ramifications.

The purpose of this study is to describe and analyze land-use changes which have occurred since 1940. In order to accomplish this objective it will be necessary to characterize briefly the geographic environment, describe the pre-World War II land use patterns, discuss significant changes in land-use, record extant distributions, and to account for variations or correspondence in present and past situations. Because of disruptive conditions associated with World War II and the early liberation period, certain information may be lacking, inadequate, or even inaccurate. Quantitative assessments will be utilized where practical, whereas qualitative evaluations must be used in the absence of specific data.

Geography

The Philippines is said to consist of more than 7,000 islands, but the overwhelming majority of this vast number are little more than rocks projecting above the sea at low tide. The principal islands include: Luzon, the largest and most populous; the Visayas, of which Panay, Cebu, Negros, Bohol, Samar, and Leyte are most significant; and Mindanao, the second largest in area. The total area of the archipelago approximates 115,000 square miles—about twice the size of Illinois—and the estimated population is about 23,000,000.

The total latitudinal extent from approximately 5° N. to slightly more than 20° N. produces an environment which is essentially "tropical," in temperature. Because of elevation the mountainous portion of Luzon has lower average temperatures. The island group may be considered to be well watered, although significant variations in precipitation do occur depending upon location and exposure. Seasonal distribution of precipitation is markedly different from place to place. As a generalization it may be assumed that seasonality is more pronounced as one goes from south to north. Further, a generalization which has merit, but which may fail in terms of a specific locale, is that the western Philippines receive a summer maximum of precipitation, whereas the Pacific side receives a winter maximum. So far as can be ascertained every part of the Philippines receives at least 60 inches of precipitation annually.

Significant variations in this broad climatic scheme occur because of a multipilicity of elevation, slope, and exposure situations. Effectiveness of moisture may be measurably restricted because of edaphic or slope conditions. Actually, while the gross patterns of climate are relatively easily understood, microclimatic heterogeneity produces a varied biotic environment. Superimposed upon the average climatic conditions is the omnipresent threat of typhoons. The Philippines lie on a major storm track, and the frequency of typhoons may have a serious disruptive effect upon land-use. Strong winds and torrential rains normally associated with their passage cause considerable damage to life and property. Particularly destructive typhoons may drastically alter the existing land-use pattern.

Soil constitutes another facet of the environment which exerts a significant influence on land-use.

Soils of the Philippines have not been adequately studied, but a great variety are found within the relatively small area of the country. Generally, in the uplands of the central and southern part of the country, latosols have evolved in response to high temperatures and copious precipitation. Even this generalization breaks down however in areas where soils are derived from volcanic materials, limestone or alluvium. Mountainous areas of northern Luzon have

soils which exhibit many of the characteristics of the tropical podzol. The most productive soils of the Philippines are derived from basic volcanics, limestone, or alluvium. Latosols and tropical podzols are generally low in inherent fertility.

Vegetative response to the physical environment described above produced a forest cover, which was essentially complete, before settlement occurred. The forest cover was dominantly tropical rainforest of various subtypes, but conifers assumed some importance in mountainous northern Luzon. Much land was cleared for cultivation, but various estimates place the total land in forest at 60 per cent of the land area.[1]

Land-Use

Encroachment on this basic forest resource is proceeding apace. A significant change in land-use in the pre-World War II and post-World War II periods can be ascertained in the utilization of forest resources. Lumbering is expanding rapidly in response to growing domestic demands and growing overseas markets—especially those of Japan and the United States. A great controversy rages as to the effect of this increased rate of cutting. Government experts at the Bureau of Forestry insist that growth more than doubles annual cut, and that Philippine forests will remain productive forever. On the other hand, certain active and retired faculty members of the University of the Philippines College of Forestry insist that cut and destruction from fire and natural enemies is currently greater than regrowth.

Certainly, a steady erosion of forest resources occurs through the activities of the *cainginero*—shifting cultivator—as he makes his repetitive clearings. This slash-and-burn agriculture persists and expands in spite of laws prohibiting the practice. Unfortunately the influences of *caingin* agriculture are persistent—not transitory. Cogon grass (*Imperata cylindrica*) moves in, and because it is burned annually—accidentally or purposely—man-made savannas of cogon spring up in areas formerly covered with forest.

In agricultural land-use, the production of grain is the most important activity. Rice is the most important food grain, but corn assumes considerable significance in the Visayas. One of the significant land-use changes has been the increase in double-cropping of rice in the principal producing area, the Luzon Plain, and the expansion of rice acreage, both paddy and upland varieties, in frontier zones. This expansion has been especially significant in the pioneer lands of the Cotabato Valley and near Zamboanga and Davao. Other major rice areas include the Bicol Plain of southeastern Luzon, the non-corn producing islands of the Visayas, the Cagayan Valley, and terraced regions of Mountain Province on Luzon. In all a total of about 40 per cent of the cultivated land of the Philippines is planted in rice.

Almost 15 per cent of the cultivated land is planted in corn, principally in Cebu, although Bohol and other areas also produce it. Corn patterns in the pre-World War II and post-war world are very similar, although recent population pressure is seen in the increased intensity of corn land-use. Increased population pressure has forced more double- and triple-cropping than formerly, but hybrid corn which was introduced with the hope of revolutionizing corn yields failed abysmally. Corn yields continue to be poor, and high incidence of corn acreage in the agricultural scheme is usually a good indicator of poverty.

Coconuts occupy approximately 23 per cent of the cultivated land and usually are to be found along the coastal margins. Concentrations are especially pro-

[1] Norton Ginsburg (editor), *The Pattern of Asia*, Prentice-Hall, 1958, p. 337.

nounced in the Bicol region of Luzon and along the fringes of Samar, Leyte, and Mindanao. While 165,000,000 bearing trees assure the Philippines of a leading place in the exportation of coconut products, several difficulties are eroding the pre-eminent position of the Philippines in the production and marketing of coconuts. Because of poor preparation practices, Philippine copra has the dubious distinction of being the world's poorest. As competition becomes more severe a reduction in the market for Filipino copra must be anticipated. In addition, a mysterious disease, *kadang-kadang*, has been decimating coconut plantations and Philippine attempts to control it have been desultory at best. A decline in acreage devoted to coconut culture may logically be anticipated.

Abacá, which occupied about 7 per cent of the cultivated land in the period immediately preceding World War II, has declined precipitously in significance because of competition with other fibers and because of a fungus disease which has decimated the plantations. The old areas of consequence, southeastern Luzon and the section near Davao in Mindanao, have declined to the point where abacá can no longer be considered a significant crop.

Tobacco is another of the crops which has declined significantly in importance. This is partly related to a shift in smoking habits. A certain enchantment with things American has caused an increase in the importation of American tobacco products with the resultant decline in Filipino tobacco acreage. Significant tobacco districts are in the Ilocano section of northwestern Luzon and in the Cagayan Valley. The decline that has occurred in the past is, I believe, transitory. American tobacco companies are establishing manufacturing plants in the Philippines using Filipino tobaccos to produce cigarettes marketed under the American trade name. This late trend augurs well for the resurgence of tobacco production in the years just ahead.

Sugar is another of the crops which has shown a decline in acreage since before World War II. This is attributable mainly to higher per acre yields which have come as the result of increased use of fertilizer, restriction of cane planting to the better lands, and improvement of agricultural techniques. In short, fewer acres now produce as much or more sugar than were produced on larger acreages in the pre-World War II era. Further acreage declines are to be anticipated as the sliding tariff barrier of the American market increases under the terms of the Bell Act. The Central Plain of Luzon and the islands of Negros and Panay have been the principal sugar producers. And current trends point to continued decline of sugar in these areas in the face of more demands for lands for subsistence crops and increasing competition in the American sugar market.

The foregoing discussion has dealt primarily with changing trends in existing principal land-use patterns. Succeeding sections will deal with recent innovations of great significance.

One of the most important recent developments in terms of its impact on the immediate area and general significance in the Filipino economy is the Del Monte Pineapple Plantation near Cagayan de Oro in northern Mindanao. While the idea for a plantation preceded World War II, and general work was begun, the war interrupted operations and the plantation (as it now stands) is principally a product of post-war days. This modern plantation with all attendant facilities has about 18,000 hectares of rich Bukidnon Plateau land under cultivation. The living standards of plantation dwellers and adjacent settlers are measurably above their more remote neighbors. Pineapple products of the California Packing Company (a Del Monte subsidiary) are marketed under

the Del Monte brand name in the Philippines and the United States.

Foreign enterprise as represented by the Chase and Sanborn Company has fostered an infant coffee industry on Mindanao and southern Luzon. Activities of American and European companies are also instrumental in the development of rubber and spice production, especially on Basilan.

From an agricultural standpoint the next two small areas presented exert an influence and present a pattern out of all proportion to their small size. Both areas, which emphasize horticulture, are quite small, and they have developed in response to the demands of a substantial urban market. The slopes of Tagaytay ridge, south of Manila, produce significant quantities of fruit, especially papayas, citrus, and bananas for the Manila market. The Trinidad Valley, north of Baguio, is a significant producer of mid-latitude vegetables and small fruits for the Baguio and Manila market. Both of these areas are quite small, but they have established a pattern, which seems destined to spread around urban centers.

Non-agricultural land-use changes in the Philippines include the expansion of built-up areas associated with urbanism and a burgeoning population, the additional construction of manufacturing establishments, especially at the periphery of large cities, and the construction of large numbers of fish ponds at the tidal margins of the country. The Philippine Air Lines has constructed large numbers of air ports in remote sections of the islands taking significant acreages of land out of cultivation. The construction of new roads to remote areas slices away bits of potentially arable land. Mineral industry patterns remain essentially as they were in the past.

In brief, a qualitative assessment of land-use changes suggests the following significant trends: 1) a steady, slow but sure, diminution of forest lands in the face of an active lumber industry and encroachment by the *cainginero;* 2) a significant increase in the amount of land devoted to food crops in response to population pressures, pioneering, and reclamation; 3) a significant reduction in acreages devoted to traditional commercial crops, (*i.e.* sugar, cigar tobacco, and abacá) because of market competition, tariff problems, disease, and shifting market demand; 4) a measureable expansion in land devoted to new commercial crops such as pineapple, cigarette tobacco, rubber, and horticultural crops; 5) an increasing tendency towards the expansion of urban accouterments; and 6) the development of a significant fish farming industry associated with tidal reclamation.

PROJECTED HYDRO-ELECTRIC SCHEMES IN BASUTOLAND

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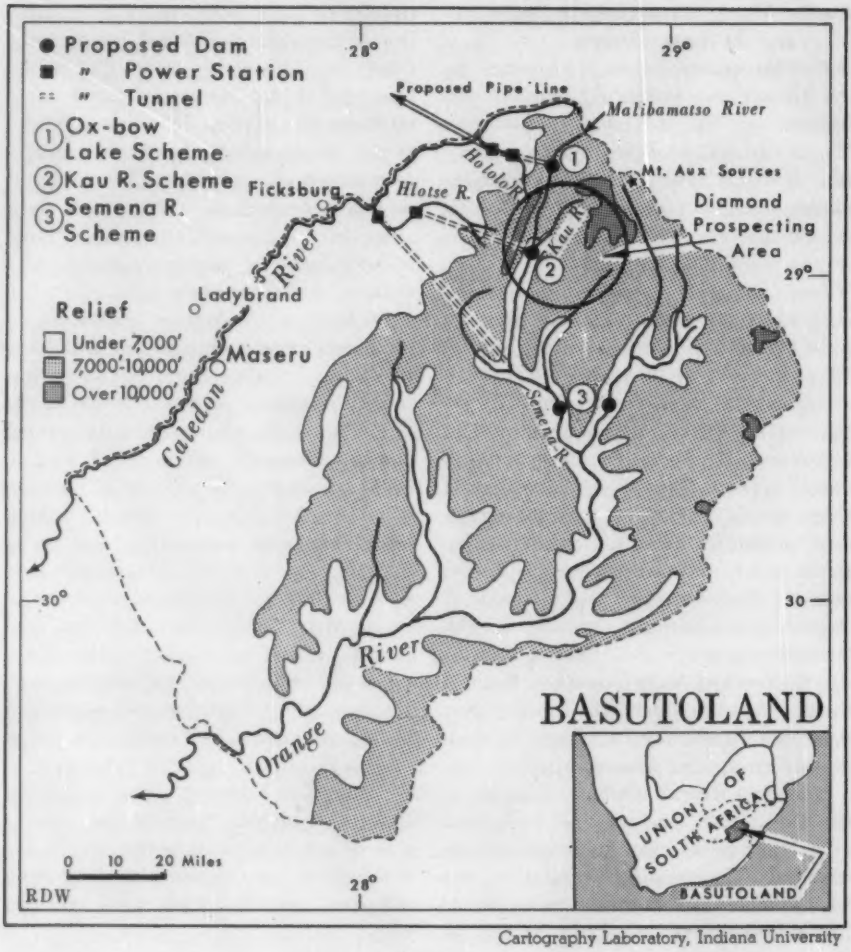
Introduction

BASUTOLAND, a British Colony of some 11,700 square miles surrounded entirely by the Union of South Africa (Fig. 1), has advanced politically a long way in the past few months.[1] It seems likely that within a decade or so further progress toward full control of the country by the Basutos will be made. Economically, however, the territory remains very backward,[2] with soil conservation

[1] 35,302 persons out of a total electorate of 191,663 Basuto, Whites and Asians voted on 20th January, 1960, in the Colony's first general election; the Colony will shortly have its first Legislative Council to be known as the Basutoland National Council.

[2] The situation in Basutoland of relatively vigorous political advancement and a weak economy, contrasts markedly with that in Swazi-



Cartography Laboratory, Indiana University

FIG. 1

schemes gallantly striving to restore and stabilize the lowland soils.

A much-eroded country without factories or industrial undertakings, with almost no mining development, with but one mile of railway, three of tarred roads and eight hundred and fifty of gravelled or earth roads, Basutoland depends heavily on the Union of South Africa and the United Kingdom for its economic survival. To the former it sends annually over 43,000 laborers to work in the gold, coal and diamond mines[3] (the gold mine labor is worth over £½ million to the territory[4]) and sells £1½ million worth of agricultural products (mainly wool, mohair and cattle); from

land where the economy is being rapidly developed and diversified in a politically unprogressive society.

[3] *Annual Report on Basutoland*, 1958, H.M.S.O. The 1956 Census revealed that 154,782 males and females were "absent outside from the country."

[4] *The Mining Survey*, Vol. 5, No. 1, 1954. This amount comes to Basutoland "in the form of administrative expenses of the Native Labour Organisations and in deferred pay to the native mineworkers and remittances to their families." See also *Annual Report*, 1958, p. 33.

the Union it purchases over £3 million worth of general merchandise, maize and maize meal. From the United Kingdom grants (under the Colonial Development and Welfare Acts) totalling more than £2 million have been made available since 1945. Of the 206 Europeans who administer the country and serve in its medical, educational, public works and other departments, many are from Britain and the Union. The remainder of the 2,000 European population is made up of missionaries and traders, their families and the families of the government officials.

The economic links between the Union and the Colony are likely to be strengthened further as both countries develop their resources. The strengthening will be to the advantage of both and neither can or should ignore the possibilities for beneficial co-operation in the economic field. At the same time both countries will approach these possibilities with caution for the political situation is fraught with difficulties[5] and economic nationalism or autarchy is likely to command much support.

This article examines certain power and water development schemes in Basutoland which have been under consideration for some years. One of the schemes has progressed to the point where the results of preliminary research have justified more intensive investigation, and where actual physical developments are now being considered for the near future.

Physical Background

The topographical background to these schemes, and indeed, to almost any development in the Colony is a mountainous one. The Basuto Highlands or Maluti are generally over 6,000 feet and rise in the north to a summit plateau of over 10,000 feet; the highest point so far fixed is Thabana-Nylenyana, 11,425 feet. The Maluti form a watershed area between the southeasterly flowing Natal rivers, which rise high up in the Drakensberg escarpment, and the south westerly, westerly and northerly flowing rivers which are all tributary, eventually, to the Orange River. The Orange itself has its source in northwest Basutoland at Mont-Aux Sources (10,763 feet), whilst one of its major tributaries, the Caledon, which is coincident with a long stretch of the western Basutoland boundary, rises to the northwest of the Maluti Mountain (9,000 feet) and drains western or lowland Basutoland or Lesotho. Basutoland, in which rise over 200 of South Africa's rivers, is indeed a "sponge" for much of the Union. The gorge-like character of the valleys of the headwater streams of the Orange, the geological formations in the Highlands—the hard upper beds of the Karroo System, the thousands of feet of black basaltic lavas and the massive yellow Cave Sandstone—together with the rainfall which in the northern areas exceeds 40" per annum would suggest that Basutoland is a natural area for the regional development of water schemes.

Three Schemes

Three schemes were investigated and reported on by a Cape Town consulting civil engineer in 1956.[6] The scheme likely to materialize first envisages the construction of a 400 foot high dam on the Malibamatso river which rises to the east of the highest range of the north-south trending Maluti Mountains. The dam would create a lake—the Ox-

[5] Amongst the difficulties might be mentioned the Union's claim for the incorporation of the High Commission Territories (Basutoland, Swaziland and Bechuanaland Protectorate), a claim based on a provision in the 1909 South Africa Act, the Union's present (May 1960) racial policy of "apartheid" and the Basutoland Congress Party's demand for the "return" of the whole of the Orange Free State and parts of the Cape Province (see *Drum*, 1960, pp. 52, 53, Johannesburg).

[6] Ninham Shand, *Report on the Regional Development of the Water Resources of Basutoland*, 1956. Library circulation, Natal University, Pietermaritsburg, South Africa.

bow Lake—and a diversion tunnel 5 miles long will be driven through the mountains; a high pressure tunnel will take the water to power stations on the Hololo River, a tributary of the Caledon. An Upper Power Station at 6,270 feet will generate hydro-electric power utilizing the 1,930 foot fall in the high pressure tunnel from the level of the Ox-bow Lake, whilst a second power station at 5,460 feet will be fed by further tunnels from a regulating dam some 20 feet below the higher of the two power stations.

The second scheme involves the damming of the Malibamatso and Kau rivers at their confluence, and the diverting of the waters westwards through the Maluti Mountains by means of a tunnel some miles in length, to another but more southerly eastbank tributary of the Caledon, the Hlotse River.

The third of the complementary schemes would involve damming the Orange and Semena rivers in the central areas of Basutoland and diverting the water, partly by tunnel, to Leribe, almost at the junction of the Hlotse and Caledon rivers on the western border of the Colony. An alternative to this is the construction of an equally long tunnel to take the water to power stations in the more southerly Teyateyaneng area.

The costs for the three schemes (with the annual output in million kwh.) were estimated in 1956 as £8¾ m. (350 m.); £12-15 m. (350 m.) and £45-50 m. (1,000 m.) respectively.

A subsidiary of the Ox-bow Lake Scheme, as the first is now called, is the construction of a pipe line to carry 40 m. gallons of silt-free untreated water per day (a portion of the discharge from the turbines) from the regulating dam (6,250 feet) below the Upper Power Station, by hydraulic gradient to the Free State goldfields (at about 4,500 feet). This pipe line would be 120 miles long and was estimated to cost £7½ million. The water could instead, however, be added to the supply of the lower power station thereby increasing its output by 50 m. kwh. per annum—with negligible increase in capital costs in the Ox-bow Lake Scheme.

The benefits from these three complementary schemes would be (a) hydro-electric power, (b) water, and (c) regulated flow in the Caledon (which, at present, has very low flows in the winter months particularly June but is, however, perennial, having an average of 359 days of flow per annum) and stabilized flow in the Orange. Furthermore, the schemes were so designed that their points of discharge are all sufficiently far upstream to fit in with Union schemes for diverting the Caledon River, by means of a tunnel, to supplement the water resources of the Free State.

Markets

Assuming that the schemes are physically possible, the question of markets for the power and water is the vital one. In this respect, as in the development of the rivers and their catchment areas, there appears to be some scope for co-operation between the Union and Basutoland.

Power. Some 2,000 domestic and commercial consumers in the Colony take electricity from the Maseru Electricity Supply. Apart from that associated with building developments in Maseru, the demand over the past few years has not increased markedly, and there is not likely to be in the foreseeable future any great demand for domestic uses. There are, however, a number of potential power markets within the Colony. Diamond prospecting operations, being carried on by a South African mining house in the mountainous areas of north Basutoland,[7] have yielded encouraging re-

[7] *Annual Report on Basutoland*, 1957, p. 5, and *Johannesburg Sunday Times* (February 15, 1959).

sults, and should a diamond-mining industry be established, the Ox-bow Lake Scheme would have a very considerable local consumer; indeed one mine could absorb about 25 per cent of the power output from this scheme. A second internal market would develop should the Colony start processing its own wool, mohair, hides and meat. These primary industries might well develop as a result of the availability of cheap power. In the same way agriculturists in Basutoland might well start powered spray irrigation.

It is clear from the Consultant's report that the Union, and in particular the Free State, was seen as the major consumer of the power. The development of the Free State goldfields is indeed making increasingly greater demands on the Union's power lines; the 1958 power consumption of the mines alone was 10 per cent up on the 1957 figure.[8] The estimated net cost of power from the Ox-bow Lake Scheme delivered at the Basutoland-Free State border was 0.34d. per kwh. (1956 estimates), comparing favorably with the average costs in the Rand Undertaking of Escom of 0.366d. per kwh. and in the Natal Central Undertaking of 0.633. However, new power stations and plant under construction in the combined Rand and Orange Free State Undertaking, based on the Union's vast reserves of coal, seem capable of meeting electricity requirements in the Free State for many years to come. In view of the Union's coal resources it is not surprising that "first discussions with potential customers" were reported as "discouraging."[9]

Water. Basutoland's capacity to absorb the water made available by these schemes is as small and long-term as its ability to utilize the power supplies. It is possible that some of the water could be used for irrigation in the vicinity of the schemes, whilst the establishment of industries in northwest Basutoland would create a demand for silt-free water.

The prospects for selling water in the Union are, perhaps, better than those for selling power. It has been calculated that by A.D. 2000 there will be a considerable shortfall in the water supplies in the areas dependent on the Vaal River, and that the Union will have to negotiate with Basutoland on the possibility of diverting water from the Caledon into the Vaal Basin.[10] Meanwhile, however, development schemes to provide water in the Free State and Southern Transvaal are proceeding independently of and, apparently, with little enthusiasm for the Ox-bow Lake Scheme's pipe line project. This pipe line could supply water to the Free State goldfields at 10d. per 1,000 gallons (1956 figure), a figure substantially below that charged to bulk consumers by the present suppliers; the charge of 2/—per 1,000 gallons is more than doubled for domestic users. In addition to this possibility, the regulation of flow in the Caledon could benefit the towns of Ficksburg and Ladybrand as well as irrigators and other users along the river valley. Union Irrigation Department schemes on the Caledon and Orange rivers could derive a steady source of water (the Ox-bow Lake Scheme alone would provide 145,000 acre feet per annum) from the improved flows of these rivers.

A factor of importance in these considerations is the availability of underground water pumped from the Free State gold mines. Whilst it is possible that a satisfactory means of desalting this water will be found, thus enabling the water to be used, it is also possible that the underground supplies will become exhausted.

[8] *Annual Report*, Electricity Supply Commission, 1958.

[9] *Colonial Development Corporation*, Report and accounts for 1957, H.M.S.O.

[10] *The Vaal River*, Natural Resources Development Council, U.G.40/,1953.

Hydrological Research

Since May, 1957 a fully equipped meteorological station has been functioning in the Ox-bow Lake Scheme catchment area. A network of mountain type rain gauges has been in operation in the area since 1955. River gauging weirs with automatically recording equipment have been installed on the Malibamatso, at the proposed dam site, and on three other rivers, for a somewhat shorter period, measuring stream flow and depth.[11] An analysis of the data collected over this short period has revealed that the mean annual rainfall in the catchment area is likely to be 8 per cent lower than originally estimated.[12]

Present Position

The hydrological data obtained so far and the very uncertain prospects for marketing large power and water outputs, have led to consideration of development by stages, starting with a pilot project. The pilot project is based on the Ox-bow Lake Scheme and would require a dam only 200 feet high and a small power station. It is envisaged that the pilot scheme would depend mainly on the internal market for power and water.

Although the project is so much smaller than those outlined in this article, it may well prove to be the pioneer in the much greater development of the Colony's power and water resources. Meanwhile plans are afoot to explore in greater detail the hydrological and marketing aspects of the Ox-bow Lake Scheme, and these investigations are certain to range beyond the political boundary of Basutoland. In the wider setting of continental Africa, the potentialities and problems may be compared with those associated with the development of such international rivers as the Nile, the Niger, the Congo and the Zambesi.[13] It seems clear that, as one Orange Free State industrialist has said, the time is now ripe for the two governments who have interests in the catchment areas of the Orange and Caledon Rivers to get together on a long-term plan.[14]

[11] Annual Report (1958), p. 27.

[12] The writer is indebted to the Director of Public Works, Maseru, Basutoland, for time spent in discussing some aspects of the Ox-bow Lake Scheme.

[13] On the Zambesi see H. J. de Blij, "Some Aspects of the Kariba Hydro-electric Project in the Central African Federation," *The Journal of Geography*, LVI (December, 1957), and Monica M. Cole, "The Kariba Project," *Geography*, XLV (January-April, 1960).

[14] *Supplement to The Friend* (Bloemfontein Orange Free State) (August 7, 1956).

JUNIOR HIGH GEOGRAPHY—GROWING PAINS OR ARRESTED DEVELOPMENT?

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THAT THERE is cause for optimism concerning the growth of junior high school geography is evident. However, it is also evident that this growth will not be without its difficulties; its growing pains. How well we can tackle and overcome these will determine whether optimism can become reality.

Today Trend Favors Geography in the Curriculum

There is ample proof that interest in geography has grown since World War II and during the long period of the cold war that has followed. Reasons for the necessity of geographic understanding of

the world and its people are more evident with each passing day. Recent world affairs have created an awareness of this need if people are to understand the nations who turn to us for aid. The increased numbers of geography courses for junior high school and the trends in the curriculum give cause for assurance. There is growing dissatisfaction with social studies by teachers, administrators, newspaper men, parents and the general public accompanied by the recognition of the ignorance in geography. What formerly might have been just natural curiosity about people and regions of the world has become a quest for knowledge and understanding that is paramount to peaceful existence on this earth. It is of even greater importance to our young people who are just beginning their lives in this age of jets that travel 700 miles an hour, where distance is measured not so importantly in miles as in hours of distance and where the race for intercontinental missiles and artificial satellites is going on in deadly earnest. This peaceful existence depends upon our accepting, respecting and understanding other peoples' customs, problems, potentials, resources and interrelations with us. The underdeveloped areas of the world cannot hope to find a solution for their problems when we offer them advice based on historical experience in this country. Dense populations, with every indication of greater density, in areas that are land poor is not to be compared with our history of great industrial expansion during a period in which we were land rich and population poor. The geographic implications here are apparent to us: Would that they were apparent to those who do not know the scope of geography!

Growth of the United States into a primary power eliminates the possibility that any other great power can leave us in isolation or in a state of neutrality. *Other current factors* have many implications for the need of modern geography study: (1) the great mobility of people of today, (2) our knowledge of weather and the value of the satellites in aiding us in our study of it, (3) man's efforts to convert desert into arable land, (4) salt water conversion to meet our growing shortage of fresh water, (5) new sources of power that may revolutionize industry, and (6) the rapid but inevitable changes of the people in underdeveloped lands as expressed in their desire to increase economic growth for their countries, accompanied by a diminishing resignation to poverty, disease, and low standards of living. These and many current issues are the ingredients that make geography a living subject and a crying need in the education of our young people.

Current trends in the curriculum seem to indicate that this need is on its way to being met in some small measure. A survey of the courses of studies of the various states shows that there is an increased number in the junior high school dealing with world geography or geography of the eastern hemisphere. Wilhemina Hill's article in the JOURNAL OF GEOGRAPHY indicates that she finds a trend to "geographically–oriented" studies of man and his progress on a world-wide basis as being achieved by the end of the tenth grade.[1] The Encyclopedia of Educational Research indicates the trend toward more geography for the seventh and ninth grades. It is well to note that with the exception of World Geography which is taught in most schools, there is little consistency in what is offered. A survey of geography practices in secondary schools (grades 7-12) by a committee of the National Council for Geographic Education is somewhat out of date since much has happened since 1955, but at that time there was a healthy 58 per cent

[1] Wilhelmina Hill, "New Developments in Geographic Education," THE JOURNAL OF GEOGRAPHY (May, 1960), p. 234.

of the responses indicating increased interest in the field of geography and 66 per cent favoring separate courses.[2]

Research also reveals that there is a current, growing resistance to correlation, fusion, integration, or what have you, to the social studies. More demand is being made for specific labels and courses such as history and geography. More people have become vocal about the weaknesses of the social studies field labeling it "superficial," "overwhelming," "too comprehensive," etc. A former president of the NCSS presents his view in a recent edition of *Social Education*, "We attempt the impossible in terms of coverage of material within the time allotment."[3] He goes on to state that the "creeping curriculum" has made the social studies a respository for all instructional material that other subject areas refuse. He believes that the value of organized subject matter out-weighs the advantages of the integrated approach and we do ourselves no service by labeling all courses under the amorphous title of social studies.[4] Parents also may be heard who object to life adjustment classes conducted in schools where supposedly knowledge is the goal. They feel that the chief responsibility for adjusting their children lies in their hands. How successful they are is their responsibility also. (We won't digress into that controversial issue.)

Praise the press and bless that television, for they, too, have been disciples for the cause of geography. In 1952, Dr. Benjamin Fine's articles appeared in newspapers all over this country proclaiming the ignorance of geography among our high school graduates who have entered colleges and Universities. Only 5 per cent of all college students were enrolled in geography courses, although 77 per cent of the colleges offered these courses. Why? They probably didn't have the vaguest notion as to what they would learn since they had never had any geography and the colleges probably didn't require it in their general education background. In 1960, Dr. Fine made a similar survey of geographic knowledge of students in thirty-four colleges and universities of the United States. The public read in the daily newspapers the appalling ignorance of these young people who couldn't tell what is the population of the United States, and who believe that Cuba and Puerto Rico were trust territories under U. S. administration. Some even thought that the St. Lawrence Seaway was built to connect the Atlantic and Pacific Ocean or that it was built for a summer fishing resort. Only 19 per cent could name four communist ruled countries, and a mere 8 per cent knew U.S.S.R. stood for the Union of Soviet Socialist Republics! Dr. Fine's answer to the above problems was there for everyone to read; more courses in high school geography.[5]

Television, too, has contributed to this growing interest and need. News coverage, documentaries about world problems and other countries, even the settings of such entertainment programs as Dinah Shore, Perry Como to name a few have been around the world. All of these have contributed immeasurably to the curiosity and interest in knowing more simply by a flick of the wrist that tunes on the family's favorite pasttime, watching television.

[2] *Status of Geography in Secondary Schools of United States.* Special Publication,, National Council Geography Education, April, 1956.

[3] John H. Haefner, "Proposals for a Social Studies Curriculum," *Social Education*, (May, 1960), pp. 201-205.

[4] *Ibid.*, p. 202.

[5] Benjamin Fine, Newspaper Articles in *Evening Star*, Washington, D.C., February 29 and March 1, 2, 1960. There is other enlightening research concerning this lack of knowledge. Prof. Bloom in his comparison of samplings from millions of General Educatitn Development tests given to college freshmen found marked improvements in all subject areas except geography and spelling.

Among the contributions of those who are not directly involved in geographic education is the Conant report on Junior High School. He advocates that all students have social studies each year, but that the emphasis be on geography and history. His comments are respected because of his widely read reports on the Senior High School.[6]

What Are the Growing Pains?

Having used the approved psychological approach of accenting the positive it is now time to present the negative . . . the growing pains. The growing pains and their manifestations are equally as easy to find as the evidence of growth in interest.

These are the problems as they are reflected in recent articles and events. There is a lack of understanding as to what geography really is. A reluctance to replace traditional courses with something new or not understood exists. Geographers as a group made no real stand as to what emphasis should be taken or what sequence should be followed. Suggested sequences that have been advocated in the past by individuals are out of date with the times. The curriculum is bulging with the increased offerings and demands of the post sputnik period. Administrators are indicted for their lack of sympathy or their lip service to the need without actually doing anything about it. Textbooks on geography are not being published and the ones that have been are too easy, too hard, or encyclopedic. Frequently mentioned is the lack of supply of qualified teachers, the adequacy of their training, and the questionable value of introducing courses under these circumstances. If all these are to be given credence, it is a formidable list of difficulties to overcome.

The Teachers of Junior High School Geography

My chief concern and the concern of so many others is the supply, quality, and training of the teachers who handle these geography classes. If a solution could be found for this one problem it is more certain that the other growing pains would fade and diminish in importance. The Board of Education of the City of Chicago recently put into effect a World Geography course for grade ten, PROVIDED they can acquire one hundred trained geography teachers within the first year.[7] They feel that the program will succeed or fail in relation to the quality of the teachers available. Few would dispute this. Any program, any school, any subject is as successful as the teachers who teach in it! This is an unequivocal truth.

Can It Be That the Teaching Has Retarded Geography?

Quality of teaching in junior high school geography must surely be based on many things but two major factors are of prime and equal importance. The teacher must know his subject matter, and he must know and understand his pupils. There is abundant evidence that social studies teachers are inadequately equipped in geography, yet it is also true that geography is often taught by these teachers. Worse than that is the fact that there are those who teach geography without ever having had it as a subject in elementary, high school, or college. With the advent of social studies in the school this is true of more and more of our teachers. Can this be one cause of the lack of sympathy toward initiating more geography education in our secondary schools?

A closer look at the training of these social studies teachers who voluntarily or involuntarily are assigned to teach geog-

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[6] James Conant, *Recommendations for Education in the Junior High School Years*, Princeton: Education Testing Service, 1960.

[7] "Teachers of High School Geography Needed —Can You Qualify?" THE JOURNAL OF GEOGRAPHY (April, 1960), page 185.

raphy is disturbing. Approximately 40 per cent of the social studies teachers major, is normally given to history. Political Science, Economics, and Sociology represent 15 per cent of the average requirement. Geography scraps a meager 7 per cent.[8] A study of Illinois social studies teachers shows the following *lack* of state requirements for certification; history, 18 per cent; political science, 36 per cent; geography, 81 per cent. One fourth of these teachers do not have majors in social studies at all.[9] Are we to believe that administrators think that anyone can teach in this field provided he can breathe, talk, read, has a map and a degree?

How do the colleges and universities do in the training of these social studies majors? A study of colleges and university requirements of the United States, the distribution of time spent in various fields for social studies majors shows the following average medians in semester hours: History 16, Political Science 6, Sociology 6, Geography 3. It is no strange coincidence or irrational thinking that makes geographers frown upon the fusion, correlation, or integration of geography, or that makes them object to just anyone teaching a course in World Geography. Curricular integration cannot guarantee integration if the teacher does not have the resources and knowledge to do it. Core curriculum has been far from successful for just this reason. Modern Problems courses which are one of today's answers for streamlining the bulging curriculum are doomed because of this same lack of ability and broad training of the teacher. "Let's give them an in-service course" is only a partial answer. One course won't insure the ability to think geographically any more than one course in history could teach someone to think historically. Colleges simply must turn out teachers who have better balanced and more thorough training in each of the disciplines of the social studies. We cannot be deluded into thinking that all social studies will die a sudden, timely death.

Geography majors are in slim supply. An increased number of them is needed to teach these newly initiated courses. Teachers specializing in geography need the same broad training as the social studies major, if they are to succeed in truly making geography the bridge between the natural and social sciences. History, sociology, political science, economics, physical sciences, and training in the reading and intrepretation of maps for the various levels should be studied. Methods, techniques, classroom management, and other elements of successful teaching should not be neglected or allowed to be learned by osmosis. For emphasis, I repeat that knowledge of subject matter is of prime importance but equal to it is the knowledge and understanding of the adolescent who is to receive this instruction.

If this training of teachers could be corrected there would be more understanding of what geography really is, less criticism by administrators, less resistance to give geography its proper place in the program, and less need for that all-inclusive, all-inspiring textbook so many worry about getting. How did you acquire an interest in your major field of study? Who was it that kindled your interest, spurred you on, gave you the desire to make it your life's work? Could it be that some master teacher shared his enthusiasm and knowledge with you and gave you an insight into the real scope of geography? Have you as a teacher transferred this desire and insight to your students? If you have, you may be sure that the parents have received it too. A visit

[8] Willis Moreland, "The Academic Preparation of Social Studies Teachers," *Social Education* (December, 1958), p. 384.

[9] V. Pholmann, and F. Wellman, "Are High School Social Studies Teachers Adequately Prepared?" *Social Education* (November, 1960), pp. 310-312.

to your class may enlighten that principal, superintendent, or supervisor. At the college level, it means that you will be sending us more teachers with geography majors or minors.

The Need for Direction in Curriculum Planning

Now to one other basic cause for growing pains! Where can interested school curriculum makers go to find direction in planning for geography in their curriculum revisions? Shall we leave their guidance to the choice of the best available textbook? It is done, you know. Shall we leave them frustrated by their attempts to locate recommendations bearing the stamp of approval of those who know geography best? Shall we allow their fledgling interest to dissolve into resignation to the traditional pattern of history of United States three times in six or seven years? "The vaccination theory of instruction—repeated inoculation results in immunity has been decisively validated by our courses in American History at grades 5, 8, and 11, and our civics courses at grades 9 and 12. We are desperately in need of some more effective type of treatment."[10] The logical organization for suggesting and disseminating a scope and sequence for geography instruction that is up to date is to be found in the one organization devoted to it, the Council for Geographic Education. Publication of such a suggested program is no guarantee of its adoption, but it will bear the official approval of the group most qualified to have an answer. For those who are sincerely and honestly seeking direction, it would certainly be considered.

The membership of this study group or committee should stress representation of various interests; those who are actively engaged in teaching in junior high school, those who represent the other levels of instruction, those who supervise geography teaching in the public schools, and those who have had past experience in building scope and sequence. If a group of trained geographers meeting these criteria are not able to agree, then it is questionable as to whether we should expect much sympathy and understanding.

There has been much spade work done on such a study. Preston James has presented his ideas on culture areas as a basis for study. Philip Bacon has some questions concerning the traditional program in relation to the population impact. Henry Warman has many suggestions for changing emphasis in geographic education. No matter how soon this work can be completed, published, and distributed throughout the country, it will be too late, but "'tis better late than never."

If publicity is what we need to educate the curriculum makers with the point of view of geography, let's have it! The *Report of the Commission on the Teaching of Geography*,[11] edited by Neville Scarfe can be one of our mighty missiles of communication. It is comprehensive, enlightening, and fascinating reading for geographers and educators alike. Keep in mind that officials of our school systems are being bombarded by requests for science, mathematics, social studies, reading, spelling, foreign languages, music, and art *ad infinitum*. Conscientious members are weighing the values of each demand in the light of the needs of their pupils as they see and understand these needs. They undoubtedly are not going to be poring over tomes of geographical literature seeking knowledge they don't have. Let's send them the report, or excerpts from it, and count the costs of such a project as the price of corrective treatment for a major growing pain.

[10] John Haefner, *op. cit.*, p. 202.

[11] Neville Scarfe, *Report of the Commission on Teaching of Geography in School*, International Geographical Union, Denoyer-Geppert Co., Chicago, 1956.

Conclusion

If core and general education are to persist let's investigate the possibilities of team teaching, and television teaching, and publish our experiences in magazines for others to read. Since integration and the social studies continue, let's hammer home that geography is the only real integrating subject which can serve as a core. Then let's prove it. With the awakening of public interest and respect for education and knowledge, magazines are more interested in accepting articles which will appeal to the parents and general public.

Classroom teachers serve in the front lines as the family doctor, for these growing pains. It is they who prove the effectiveness and value of geography whether it is taught as a separate subject or as a part of the integrated social studies. In the junior high school where children are beginning to make their choices for a life work, where they are maturing in their understanding of their role in a democracy, where they are filled with a great desire to solve the world's problems, these teachers have in the making those who will influence the future trends in education. A student reflects a master teacher.

It is earnestly hoped that those of you who know the real scope of your subject, will be able to overcome the handicaps of teaching geography to pupils who come to you with little more experience in their elementary social studies than that of being able to recognize a map, a globe, or the location of their home state on a map. This is not meant to be an exaggeration; it is true of far too many pupils in too many states. If secondary teachers have a problem in specializing in one or two subjects how much more difficult must it be for the elementary teacher to master all subjects. Since colleges do not require much geography, if they require any at all, of perspective teachers, there is little chance that the elementary social studies teacher has had any.[12] However, it is you, the junior high school classroom teacher, who will inspire or kill any interest in geography. The cape and bay, locate and bound type, of geography still exists in the hands of the untrained teacher, and far too many people have had this as their only experience in geography. By knowing your students and your special field of study, it is necessary that geographers in the junior high school will prove that, "Geography is a light in the mind; not a load on the memory."[13]

How quickly and how effectively we can accomplish the work of correcting these major difficulties will determine the success or failure of the growth of geography in the junior high schools of the United States. We can prevent the growing pains from developing into a case of arrested development.

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[12] This is not a condemnation of elementary teachers. They have reason to be proud of the work they do. The courses of study for the social studies they use are often so comprehensive, superficial, all-inclusive, high-sounding that you would have to see and read them to believe it. In recent years science units have also been added to the social studies since there is no time in the day to add anything.

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THE 47TH ANNUAL MEETING WILL BE IN PHILADELPHIA

The 47th Annual Meeting of the National Council for Geographic Education will be held in Philadelphia, Pennsylvania, November 24 and 25, 1961. The Benjamin Franklin Hotel will be the headquarters. The theme of this year's meeting is "Geography in the Schools of America."

NATIONAL COUNCIL AT WORK

Coordinators Report

Among the people who work diligently in promoting geographic education and the interests of the NCGE are the state coordinators. They are:

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Arkansas—Mary L. Hileman, Arkansas State Teachers College, Normal Station, Conway
California—William G. Byron, Los Angeles State College, 5280 Gravois Avenue, Los Angeles 32
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Some of the responsibilities of the state coordinators are membership promotion, organization of state councils of geography teachers, publication of bulletins and newsletters, participation in the work of state curriculum committees, establishment of minimum requirements in geography for teacher certification, distribution of monographs, organization of geography clubs, promotion of guest lecturers (geographers) for important meetings, encouragement of research

in geographic education, solicitation of articles for *The Journal of Geography*, and distribution of announcements of meetings of the NCGE.

A few copies of the "Fourteenth Annual Report of Coordinators," distributed at the convention in Cincinnati, are still available. If you want a copy please write to me.

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THE NATIONAL COUNCIL FOR GEOGRAPHIC EDUCATION

The 47th Annual Meeting of the National Council for Geographic Education will be held in Philadelphia, Pennsylvania, November 24 and 25, 1961. The Benjamin Franklin Hotel will be the headquarters. The theme of this year's meeting is "Geography in the Schools of America."

When you write to the advertisers, let them know that you not only saw their advertisements but read the reviews and listings of their books. THE JOURNAL OF GEOGRAPHY published in the April issue the 94th review to be published during this school year, September, 1960 to March, 1961.

Have you seen the new leaflet of the NCGE entitled "Publications for Teachers of Geography and Social Studies?" You can secure this leaflet by writing to NCGE, Box 303, Faculty Exchange, University of Oklahoma, Norman, Oklahoma.

Student membership applications may be secured from Lorrin Kennamer, Secretary of NCGE, The University of Texas, Austin 12, Texas.

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Mildred & George Weston, Jr. **The Key to Boston.** J. B. Lippincott Co., East Washington Square, Philadelphia 5, Pa., 1961. 127 pages with table of contents, index and photographs. $2.95.

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Frank Debenham. **Discovery and Exploration, An Atlas-History.** Doubleday & Co., 575 Madison Avenue, New York 22, N.Y., 1961. 272 pages including maps, photographs, and index. $9.95.

BOOK REVIEWS

Lawrence Durrell. **Prospero's Cell** and **Reflections on a Marine Venus.** E. P. Dutton and Co., Inc., 300 Fourth Avenue, New York 10, N.Y. 1960, 142 and 189 pages respectively.

Many books have been written about the islands in the Aegean, the "wine-dark sea," but Durrell's engaging and refreshing "island portraits" are still the best and should remain so for sometime. In this book, the publisher has brought together Durrell's intensely interesting books, Corfu (*Prospero's Cell*) and Rhodes (*Reflections on a Marine Venus*). First published in 1945 and 1952 respectively, the books, based upon visits to Corfu in 1937 and Rhodes in 1945, dramatically demonstrate Durrell's unique genius as a writer of travel books. Durrell deals with the ethnography, archaeology, history, mythology, folklore, sociology, and arts of both islands. His descriptions of the physical and cultural tapestry of the islands are vivid, e.g., "the olive trees are stunted and contorted in an effort to maintain a purchase on this crumbling gypsum territory. Their roots, like the muscles of wrestlers, hang from the culverts." He has come to know the people of these islands intimately, because he went fishing with them, drank and ate with them, watched them tread grapes, pick olives, dance, and pray. Hence, he presents them to us not "as comic and quaint abstractions attached to picturesque names like Paul and Socrates and Aristotle." We recommend this book to those who enjoy reading poetic prose and to those who want to become more intimate with the exotic and rustic Greek islands.

PAUL P. VOURAS

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George H. T. Kimble. **Tropical Africa.** The Twentieth Century Fund, 330 W. 42nd St., New York 36, N.Y., 1960. Two volumes, 603 and 506 pages, with table of contents, illustrations, map, selected territorial data, and index. $15.00.

As one opens Professor George H. T. Kimble's study of Tropical Africa, the first impression concerns the audacity of attempting to encompass so much even in two volumes. This is truly a monumental analysis, never before equalled and not soon to be surpassed. Behind it lie several field trips, forty working papers prepared by collaborators, and the contribution of at least a thousand people in Africa, Europe and America. The index alone occupies 35 pages, and is preceded by 25 pages of territorial data. There is no bibliography because in 1956 The Twentieth Century Fund published a *Select Annotated Bibliography* as part of its *Tropical African Study*. The book contains innumerable footnotes. The volumes are enriched by 76 pages of very human photographs taken by Omar Marcus. This publication was designed to supply Americans with the facts about Africa which we so obviously need for sound policy decisions. Its public acceptance is shown in its front page treatment by The Sunday New York Times Book Review.

Tropical Africa is divided into two volumes: Land and Livelihood, and Society and Polity. The first and more geographic ranges from the economic life at the turn of the century through land and resource potentials to transportation. The second volume is more sociological, with chapters on education, health, colonial policies, nationalism, and the shape of things. In the latter, Kimble quotes from the *Times* of London (1957), "The tribe is still the strongest entity in Africa. It is stronger than the individual, it is stronger than the nation, it is stronger than the race. The only points at which it is yielding are where urbanization is taking over. It may even be that the tribe is getting stronger than weaker."

If the first impression of the book relates to its scope, the second is of its depth and understanding. This is meaningful scholarship at its best; sound, sympathetic, and penetrating. This is also beautiful writing, for few geographers have a better command of the English language.

Prof. Kimble opens the chapter on The Physical Frame with these words: "The physical personality of tropical Africa is not readily caught in a web of words, and most of the things that are true about it take long to say. It could hardly be otherwise when we consider the kind of a place tropical Africa is."

The next chapter deals with The Pattern of Population, and here we find "There are many kinds of Africans." . . . in cultural terms "we can safely say that in the entire continent there are over 750 kinds of Africans, and probably as many as a thousand" . . . in physical terms "the number is very much smaller—nearer ten than a thousand."

In discussing the Waters of the Land, Kimble writes that "length for length, width for width, and gradient for gradient, the most useful rivers in Tropical Africa are the rivers of the rain forests." And so on through 24 chapters.

The scope and viewpoint of Tropical Africa is suggested by the five ideas with which Prof. Kimble opens the book. First, Africa is "very much alive. . . . it is only a matter of hours before a cry uttered in secret in the Congo is heard on the rooftops of Manhattan." Second, "Africa is a pivotal part of . . . all four hemispheres . . . Economically, no area in the world is more dependent upon external demand." Third, "Its people plainly do not intend to be ignored." Fourth, "The peoples of tropical Africa are no longer ignorant of us. . . . The ripples made by our 'Little Rocks' have a habit of penetrating almost overnight into the backwaters of the Zambezi." "And fifth, the region almost certainly has the world's largest untapped resources."

The reader who at first glance finds the vol-

umes too imposing is captured as soon as he reads a few sentences. This is good geography; it is also great writing.

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Lorus J. & Margery Milne. **The Balance of Nature.** Alfred A. Knopf, 501 Madison Avenue, New York 22, N.Y., 1960. 329 pages with table of contents, notes, and index. $5.00.

This is a book which should please the naturalist, encourage the wildlife biologist, convince the arm-chair conservationist and cause the geographer and other social scientists to wish for more biological background to judge the validity of the authors' interpretations. The authors, through examples from around the globe and close at hand—from the distant past and few months ago, recount the adjustments of plants and animals to environmental changes wrought by man. It is thus the most up-to-date interpretation available of the impact of our new technology on the living resources of the earth. The accounts are presented in a very interesting manner, with sufficient factual information to be convincing. An excellent list of references at the end of the book testifies to the care with which the related literature was explored.

Many agriculturists and geographers will disagree with the authors' view (p. 33) that "agriculturists have done wonders in increasing the efficiency with which food can be raised if the future welfare of the soil is ignored." The entomologists and chemists who have struggled to gain mastery over pests of man, his crops and creatures, interpret in a different manner than the authors', their observation that "Despite all our new insecticides, the codling moth, the scale insects and Colorado potato beetle are still with us." The authors, the reader might conclude, would have man let nature take its course in achieving a balance since as they express it, "We thrive best by keeping nonhuman life of most kinds as thoroughly isolated as possible. . . ." No competent agriculturist denies that serious soil losses have occurred, nor do competent entomologists deny their inability to eradicate pests completely. They will point out, however, that soil losses are due to poor land management, not increased efficiency in food production, and that high quality apples, citrus fruits and potatoes are produced in abundance only because a satisfactory degree of control over codling moths, scales and Colorado potato beetles has been attained through use of modern insecticides.

Biology is not an exact science and interpretation of the way in which a balance in nature is achieved and its implications to the future of man-kind is a hazardous undertaking. The authors have fortified themselves with extensive first-hand study around the world, and drawn freely upon the careful researches of other eminent biologists in arriving at their views. They have produced, in so doing, a highly informative and challenging book. An excellent choice of drawings by Olaus J. Murie adds materially to the book's appearance.

CHARLES A. DAMBACH
Ohio State University

Griffith Taylor, editor. **Geography in the 20th Century.** Third Edition, 1957, reprinted in 1960, Philosophical Library, 15 E. 40th St., New York 16, N.Y. xi and 674 pages with glossary, index. $10.

This well known book appearing in its earliest edition about ten years ago includes contributions from 23 authors, 7 from the United States, 6 from Canada, 8 from England, 1 from Czechoslovakia, and 1 from Poland. Each of these men is a specialist in the subject upon which he has written.

A major aim of the study is to examine the fields, aims, techniques, growth, and trends of geography. The work is divided into three parts. The first deals with the evolution of geography and its philosophic basis and includes chapter headings of, Introduction: The Scope of the Volume; Geography in the Nineteenth Century; The French School of Geography; The German School of Geography; The West Slav Geographers; and Environmentalism and Possibilism. The second part of the book is concerned with special environments and with advances in geomorphology, meteorology, climate, soils and regionalism. Included in part two are chapters on The Progress of Geomorphology; Geographical Aspects of Meteorology; Climatic Influences; Soils and Their Geographical Significance; Settlement by the Modern Pioneer; Geography and Arctic Lands; Exploration of Antarctica; Geography and the Tropics; Geography and Regionalism; and Land Use Surveys With Special Reference to Britain. The last part of the volume describes field work, sociological and urban aspects, the function of the geographical society, and geopacifics—the study of all types of geography with a view to promoting world peace. Titles in part three are Geography is a Practical Subject; Geography and Empire; Racial Geography; The Sociological Aspects of Geography; Urban Geography; Geography and Aviation; The Field of the Geographical Society; Geography in Practice in the Federal Government in Washington; Geopolitics and Geopacifics; Cartography; The Geographical Interpretation of Air Photography; and the Relations of Geography and History.

Although the book appeals primarily to mature students of geography, the demand for the text has been sufficient to call for three editions, 1951, 1953, 1957, and a reprinting in 1960. Minor criticism may be justified in a few places; for example, some students may be disturbed by the limited index; and the publishers should note the discrepancy between number of pages, authors, plates, and text illustrations given in the fly leaf and those actually appearing in the text.

EARL B. SHAW
Assumption College
Worcester, Mass.

THE NATIONAL COUNCIL FOR GEOGRAPHIC EDUCATION

The 47th Annual Meeting of The National Council for Geographic Education will be held in Philadelphia, Pennsylvania, November 24 and 25, 1961. The Benjamin Franklin Hotel will be the headquarters. The theme of this year's meeting is "Geography in the Schools of America."

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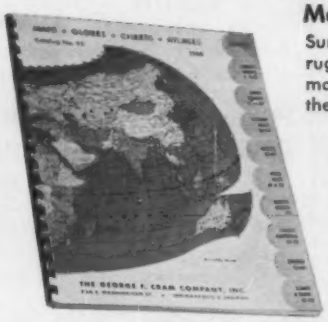

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BOOK REVIEWS

Alice Marriott. **The First Comers.** Longmans, Green & Company, 119 W. 40th St., New York 18, N.Y., 1960. 246 pages, illustrated by Harvey Weiss, with a list of state antiquities laws, bibliography, and index. $4.50.

The First Comers is intended chiefly for the 12-16 year group, although, as the jacket states, it is a book for the hobby archaeologist of any age. The author clearly states that this volume is designed primarily as a "guidebook," not as a complete description of America's prehistoric Indians. There are vivid reconstructions of the life and crafts of some of our prehistoric North American Indian groups such as the Folsom people, the ancient Eskimos, and the Anasazi peoples of the southwest. Throughout the book, however, Miss Marriott stays nicely with her "guidebook" theme.

The first two chapters introduce archaeology, discuss races, and tell how North America's "first comers" crossed the Bering Sea and spread southward. There are other chapters such as "How Artifacts Reach Museums," "How Old is Old?" (discussing cross-dating, dendrochronology, etc.), "Discoveries That Make Headlines," "Can I Get a Job in Archaeology?", and "The Hobby Archaeologist."

The book is full of sound facts and concepts. Miss Marriott tells how other sciences contribute to archaeology, how to make a "surface survey," and how *NOT* to make a dig. She also tells how to start and maintain school, club, or personal museums.

Only one map (showing how the Cross Timbers separated eastern and western Indians in prehistoric days) appears in this volume. A glossary or chronological table might have been helpful. The bibliography (subdivided mainly into regions) is very useful, but is not really designed for the young readers of this book.

Alice Marriott is a professional anthropologist, as well as an experienced writer. She has been a field and a museum archaeologist, and readers should be inspired by her own obvious love for archaeology. *The First Comers* is an interesting, authoritative book that should prove to be a valuable addition to school and public libraries.

DONALD J. BALLAS
Nebraska State Teachers College at Kearney

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BOOK REVIEWS

Dorothy Loder. **The Key to Philadelphia.** J. B Lippincott Co., East Washington Square, Philadelphia 5, Pa., 1960. 120 pages with illustrations, table of contents, map and index. $2.75. Ages 9 to 14.

Dorothy Loder's *The Key to Philadelphia* is one of Lippincott's *Key To the Cities* series written for children in the elementary grades. The book is a history of Philadelphia from its founding in 1682 to the present.

Miss Loder has avoided monotony by selecting outstanding events in the city's history and also by weaving in the lives of such famous Philadelphians as Benjamin Franklin, David Rittenhouse, John and William Bartam, John Fitch and Stephen Girard. She has given the reader a feeling for the distinctive atmosphere and personality of Philadelphia which distinguishes it from other cities of the United States.

The book is strictly historical. There is no geography in it, not even the significance of its location is mentioned. However, the book is very worthwhile for any school library. It is illustrated with over twenty excellent photographs but only one map.

Zoe A. Thralls

University of Pittsburgh

Gerald Gottlieb. **The First Book of the Mediterranean.** Franklin Watts, Inc., New York 22, N.Y., 1960. 60 pages with one map, numerous sketches, table of contents, and index. $1.95. Ages ten and up.

The First Book of the Mediterranean by Gerald Gottlieb is number 123 in a series of "First Books" published by Franklin Watts, Inc. "The First Books" are "the first books to read on more than one-hundred subjects." Teachers of geography should be pleased to find 25 or 30 first books on geographic regions, geographic factors, and related topics, for example: The Antarctic, Conservation, Cotton, The Earth, India, Maps and Globes, The Panama Canal, Space Travel, Stones, Weather, and West Germany.

The First Book of the Mediterranean is a historical geography of the Mediterranean Sea and its borderlands. The author tells how men have used the Mediterranean for adventure, for trade, for war, and for pleasure from the time of King Minos of Crete to the present. The story serves especially well in placing early civilizations in proper historical and spatial perspective.

Students and teachers will share equally in the joys of reading and looking at this book. Mr. Gottlieb's writing is excellent both from the standpoint of grammatical construction and from the standpoint of imagination-capturing cleverness; and Austrian-born Lili Rethi's sketches are delightful.

Marjorie Smith Goodman

University of Detroit

Christie McFall. **Hawaii.** Maxton Publishers, Inc., 15 E. 26 St., New York 10, New York, 1959. 28 pages. $1.38.

This "Maxton Book for Young People" is divided into a series of topics pertaining to Hawaii and Hawaiians. It has a little of the early history and something about present-day Hawaii, including brief descriptions of the eight main islands and of the sugar, pineapple, and tourist industries. Tropical flowers, fish with strange names, "liquid sunshine," and active volcanoes add color to text and illustrations. From the pictorial map on the cover to the drawing of Haleakala Crater on the last page, *Hawaii* is profusely illustrated with maps and colorful sketches. Unfortunately there is no map showing the islands in correct relationship as to location and size. The cover map is misleading in both respects. It would have been helpful also to give a simple explanation of pronunciation which could be used for all Hawaiian names. In spite of these faults, the book could be useful as interest-arousing introductory reading or as supplementary reading.

Elizabeth Eiselen

Wellesley College

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Mortimer W. Lawrence. **The Rockets' Red Glare.** Coward-McCann, Inc., 210 Madison Ave., New York 16, N.Y., 1960. 121 pages with glossary and index, 67 black and white photographs, 33 illustrations and diagrams. $2.75. Ages 10-15.

This book is loaded with exciting facts about explorers from Columbus to the astronauts and challengers of space today. It is written in a style that moves rapidly and quickly involves the reader into thinking about his potential role in science and mathematics and how these disciplines contribute to the exploration of space and outer space.

The introduction begins with "Outer Space and You. Whoever you are, wherever you are, man's efforts to conquer space will be a vital part of your life in the next ten years." It sets the tone for the six chapters by saying, "This book is a report on the first real steps into the space age, and of the centuries of preparation that made these steps possible. It is the countdown on *your* challenge—man entering a new element in *your* lifetime."

Chapter 1., Why Rockets Zoom, includes a brief story of Dr. Goddard's early work with rockets. Explanations are illustrated with diagrams a teenager can quickly grasp.

The next three chapters continue with carefully explained photographs that show the work of the scientists and people who are "preparing for the perils of space." Ten tests the astronaut must pass before his first flight into space are listed.

The closing chapter, Peace on Earth, mentions a few of the ways the race for outer space can force men to work harder for peace on earth.

The combination of illustrations, photographs, and style of writing that flows through this book appeals to the junior high student. The book motivates the reader to search for more information about outer space.

MAMIE L. ANDERZHON
William Beye School Oak Park, Illinois

K. Ross Toole. **Montana: An Uncommon Land.** University of Oklahoma Press, Norman, 1959. x and 278 pp.; maps, ills., bibliogr., index. $4.95.

Toole's *Montana: An Uncommon Land* is one of those uncommon examples of local history that is both readable and thought-provoking. All the major facts of the state's history are set forth in ten smoothly written, unsentimental, more or less chronological chapters, while the introductory chapter "The Montana Pattern" and the concluding one "The Montana Heritage" frame the chronicle with some reflections on the larger geographical and historical themes of the region. Toole takes up in turn the early explorations, the activities of the mountain men and missionaries, the patterns of aboriginal population and economy, the successive early mineral booms, the exploitation of the timberlands, the development of politics, transport, and large-scale mining, and, finally, the last spurt of massive agricultural colonization in eastern Montana in the 1910's. The recurrent pattern of boom and bust against the background of a harsh, fickle environment and physical remoteness is emphasized throughout the volume; and the author stresses as his central theme the fact that the state has always been economically a colonial area, with the key decisions controlling its destinies being made by persons and forces located outside its boundaries. This is a work that can be strongly recommended not only to the scholar and teacher concerned with the general and historical geography of Montana but also to anyone interested in gaining fresh insights into the development and personality of the High Plains and Rocky Mountain regions as a whole. The fine quality of the photographs, maps, and typography should also be noted.

WILBUR ZELINSKY
Southern Illinois University

Phillip L. Wagner. **The Human Use of the Earth.** The Free Press of Glencoe, 119 W. Lake St., Chicago 1, Illinois, 1960. 270 pages with preface, 2 maps, other figures, bibliography, and index. $6.00.

This full-length book is intended "to lay out an interpretation of man's use of the earth as the orderly function of technical systems which interact with nature under definite limiting conditions."

It is proposed that "artificial environment"—a close relative to "cultural landscape"—be acknowledged as geography's central interest; but concern with historical development and recognition of relict forms are generally ignored. Rather, there is continued reference to "order" in the artificial environment as in the natural. For example, "the location of any geographic feature conforms to certain 'rules.'" Repeatedly, the point is made that people depend on nature and the hope is expressed that the book may be a bridge between the social sciences and the physical and biological disciplines. Nevertheless, a "possibilistic" view is advocated and "determinism" is disavowed.

The Table of Contents, including Conditions of Human Life, Man's Place in the World, Human Societies as Geographic Forms, the Economic Bond, the Means of Production, Artificial Environments, Ways of Livelihood, the Commercial Environment, and a Geographic Outlook, suggests the size of the undertaking. The pertinence of some of the material, including numerous definitions from economics, politics, and sociology is hard to see.

An extensive annotated bibliography should be an aid, especially to the non-specialist, in further exploration of the field.

LESLIE HEWES
University of Nebraska

Clara Ingram Judson. **St. Lawrence Seaway.** Follett Publishing Company, 1010 W. Washington Blvd., Chicago 7, Ill., 1959. 160 pp. Illustrated. $3.45.

One hundred and sixty pages of interesting, descriptive and factual material on the Great Lakes and the St. Lawrence comprise *St. Lawrence Seaway* by Clara Ingram Judson. The book begins with a brief reference to the geologic history of the Great Lakes, tells a little about the early Indian migrations into the area, and then deals with the exploration by the French and the early settlement of the area. Following this introductory material, several chapters are devoted to the development of trade and the early canal-building projects along the St. Lawrence River, the St. Mary's River, and between Lake Erie and Lake Ontario. The last one-third of the book describes the development of the St. Lawrence Seaway and the related power project.

The most valuable parts of the book include those which tell the stories of the building of the early Welland and Soo canals. The descriptions of the problems encountered and the methods of work contain many interesting details. On the other hand, the first part of the book attempts so much history in a comparatively few pages that it might be confusing to anyone without background in the history of the area. Although there are a few incorrect statements, the material on the whole is accurate and clearly presented.

The format of the book is attractive. A number of well-drawn sketches and maps add to its value. Worthy of special mention is the excellent map of the St. Lawrence Seaway from Lake Ontario to Montreal which shows clearly both the Canadian and international parts of the seaway. The numerous black and white pictures are well selected and clearly reproduced.

St. Lawrence Seaway deserves a place in a school library. The book is suitable for junior high school students and for the advanced readers in fifth and sixth grades.

KATHERYNE THOMAS WHITTEMORE
State University College of Education
Buffalo

Mary Horkheimer Saterstrom with John W. Renner, and Teaching Units by William R. Ladson, Nellie R. McCool, Steve R. Rasmussen, Dr. James R. Wailes, and Harry K. Wong. **Educators Guide To Free Science Materials,** First Edition, 1960, Educators Progress Service, Randolph, Wisconsin. 298 pages of titles, sources, descriptive content, purposes, and uses of existing content of educational science material currently available. $6.25.

This completely new publication lists 1,060 selected free materials of which 733 are films; 111 filmstrips. 216 materials such as bulletins, books, pamphlets, exhibits, charts and posters. The subject index has more than 560 listings covering all areas of science from the primary and later elementary grades through junior and senior high school biology, chemistry, physics as well as science in business and industry.

Although there are only 5 listings under Geography, the geography teacher will find this publication tremendously helpful if one uses the subject index for each item included under the natural and cultural landscape. As an example, Forests and Forestry lists 64; Minerals 32, France 19; Conservation 59; Industries 38. These are but a few of the listings.

The book is easy to use for it has an excellent Table of Contents for curricular classification of materials, a Title Index, a Subject Index and a Source Index.

Some subject matter references are numbered in keeping with "Free Curriculum Materials" and access to that publication may be necessary to use "Free Science Materials" most effectively.

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A revised edition will be available each year. If you keep it, you must pay the stated price.

Geography teachers in all areas of instruction will find this publication truly a "Gold Mine" of quality, educational science material.

MARGARET SILL
ALBERT BROWN
Eastern Michigan University

Alicia Street. **The Key to London.** J. B. Lippincott, East Washington Square, Philadelphia 5, Pa., 1960. 121 pages with photographs. $2.75.

This little book which is well illustrated with good photographs and written in a very simple style gives an interesting description of Londoners and a popularized history of London for laymen. It is easy to read, amusing, and paints rather an attractive story of London life. It reads very much like a popular guide book but its basis is entirely history. There is no geography, whatsoever, in it and therefore could not be used as a Social Studies book on London.

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An Introduction to Geography was written for introductory courses: Regional Geography, Geography of the World, Elements or Principles of Geography. We'll be pleased to send you a copy on request.

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